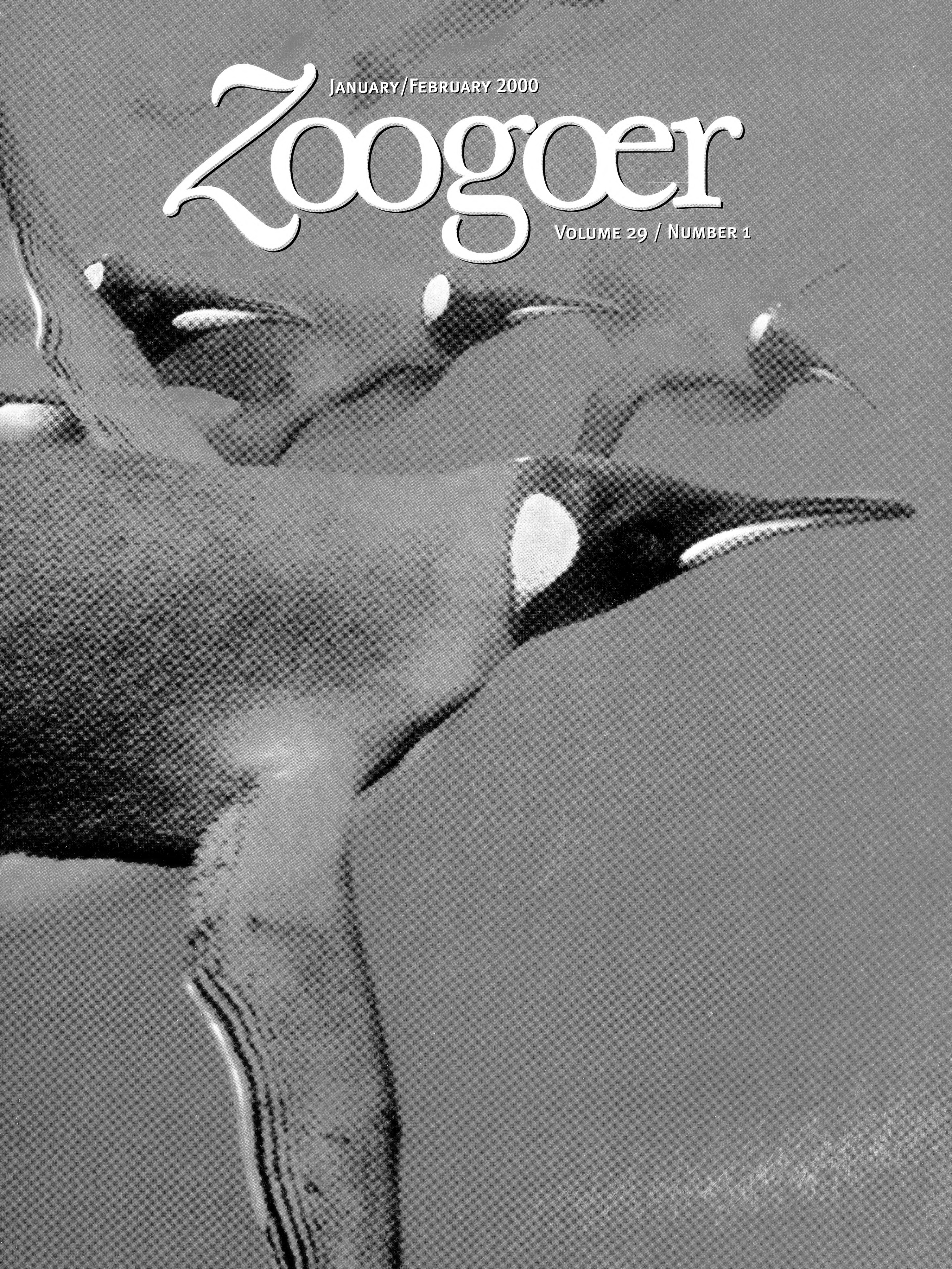


JANUARY/FEBRUARY 2000

Zoogoer

VOLUME 29 / NUMBER 1



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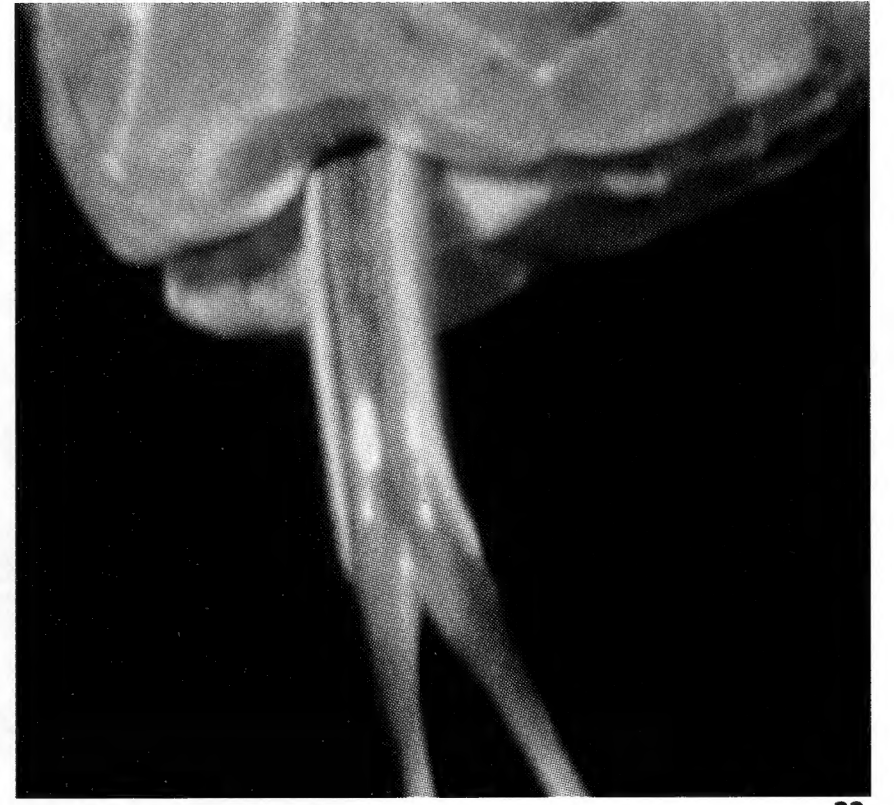
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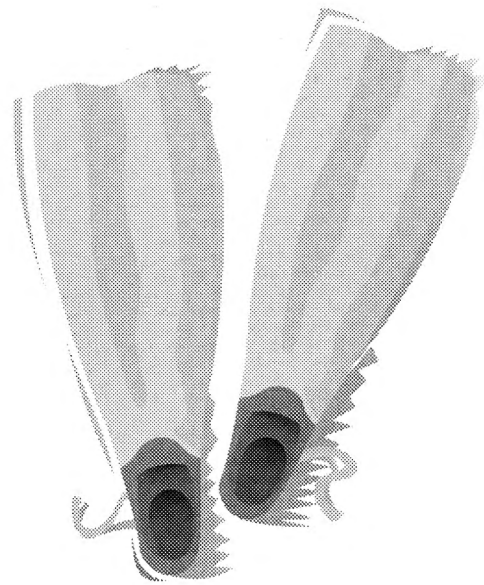
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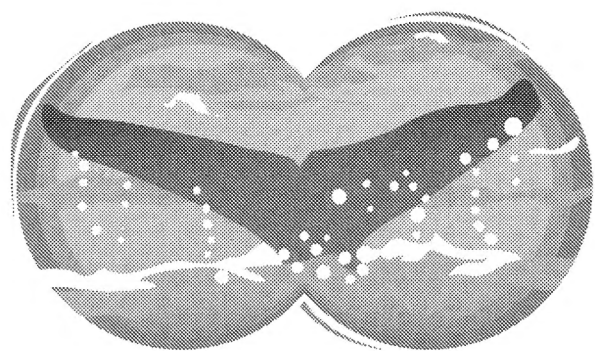
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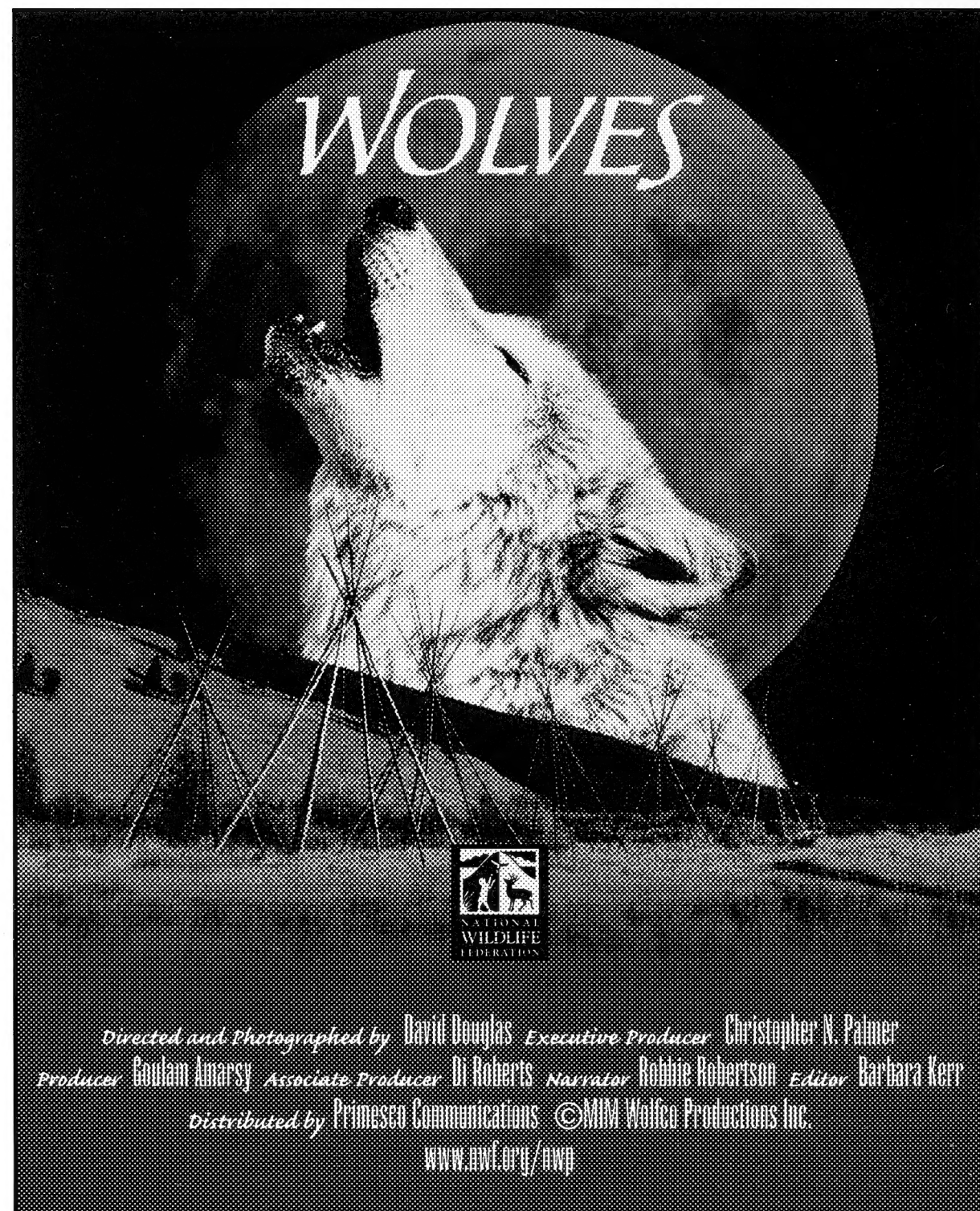
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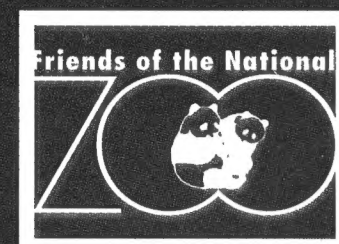


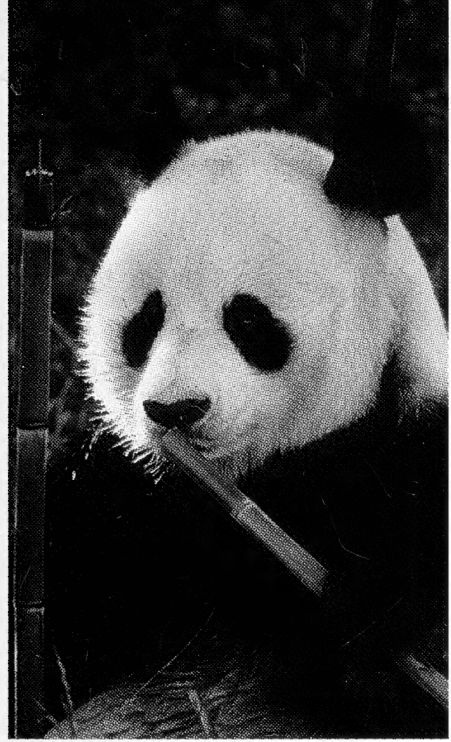
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FAREWELL TO HSING-HSING

I am writing this note just a few days after Hsing-Hsing's death on November 28. It is truly a sad time at the National Zoo. We all knew his death was inevitable, and imminent, but it still had the power to shock and sadden us.

We know that our grief is widely shared. The outpouring of sympathy from people near and far has been comforting. It reveals how compassion for an individual animal can translate into concern for a species and for all life on Earth. That is Hsing-Hsing's legacy: vast numbers of people who care about wildlife and are committed to its conservation. But we can't become complacent. In fact, now is the time to redouble our conservation and education efforts.

The National Zoo has been trying to acquire a pair of giant pandas from China to do just that. FONZ is working to raise the funds to support this effort. But bringing pandas to the National Zoo is more like a slow bumpy ride on meandering back lanes than a straight shot on the highway.

Much has been made in the media about the money involved. China is asking for about \$1 million per year for ten years; they may accept \$800,000 per year. The Zoo is offering \$250,000. Unlike the San Diego and Atlanta zoos, admission at the National Zoo is free, so pandas would not create new revenues to absorb a hefty annual payment. Further, we believe that a fundraising goal of \$250,000 a year is realistically possible, while \$1 million a year is not. (Of course, we'd love to be proved wrong.)

Whatever the amount, these funds are designated for giant panda conservation in China. The bottom line is that saving a species and its habitat doesn't come cheap. In 1988, China estimated that fully implementing its panda conservation program would cost \$100 million, and today's figure is double or triple that—a lot of money in a nation far poorer than ours. Taking one measure of wealth as an example, per capita gross domestic product in 1998 was \$3,600 in China and \$31,000 in the U.S.

Even should the money issue be resolved, many hurdles would remain. First, trade in giant pandas is strictly regulated by CITES, the Convention on International Trade in Endangered Species. This treaty, to which the United States and most countries of the world are party, is a profoundly important tool in endangered species conservation. The goal of CITES is to take the profit out of trade in wildlife. Without CITES, it is entirely possible that African elephants, rhinos, tigers, and, yes, giant pandas—any species with value in commercial markets—would be extinct today.

As the CITES authority in the United States, the U.S. Fish & Wildlife Service must issue a permit to import giant pandas into the country. To obtain the permit, we have to demonstrate that the purpose of the importation is not commercial. The Zoo has prepared a draft permit application requesting the importation so that our scientists can continue to contribute to the understanding and conservation of giant pandas. Given the Zoo's long history of groundbreaking research in this area, we fully expect that a permit would be granted. Still, the process is often lengthy. An application cannot even be formally submitted for consideration until the particular pandas to be imported are identified.

At the other end, China's CITES authority must issue an export permit to the agency that agrees to provide a panda or pandas. And here's another rub: China's zoo pandas are under the control of the Chinese Ministry of Construction, while wild pandas, and pandas at one breeding facility within a panda reserve, are under the State Forestry Administration. Like any two government agencies anywhere, they have slightly different interests and agendas. The National Zoo, concerned with both zoo and wild panda conservation efforts, would like to work with both.

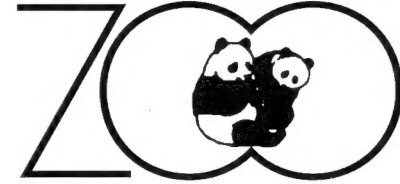
I tell you all of this because I am deeply concerned about suggestions in the media that bringing pandas here is just a matter of money. It is not, and cannot, be just a matter of money. If it were, anyone with deep pockets could buy pandas, and demand would soon drive them into extinction. Our efforts to bring pandas here are about conservation, and doing the best we can to contribute to panda conservation in the wild and in zoos inside and outside of China.

Despite the obstacles, we remain hopeful that a pair of pandas will delight and educate another generation of children who visit the National Zoo, and confident that our scientists will make breakthroughs to ensure that pandas will survive to delight and educate their children as well.

Sincerely,

Clinton A. Fields
Executive Director

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is a nonprofit organization of individuals, families, and organizations

who are interested in helping to maintain the status of the Smithsonian National Zoological Park as one of the world's great zoos, to foster its use for education, research, and recreation, to increase and improve its facilities and collections, and to advance the welfare of its animals.

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The Smithsonian National Zoological Park is located at 3001 Connecticut Ave., N.W., Washington, DC 20008-2537. Weather permitting, the Zoo is open every day except December 25. Hours: From May 1 to September 15, grounds are open from 6 a.m. to 8 p.m.; buildings, 10 a.m. to 6 p.m. From September 16 to April 30, grounds are open from 6 a.m. to 6 p.m.; buildings, 10 a.m. to 4:30 p.m. **Director:** Michael H. Robinson.

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Cover photo: King penguins (*Aptenodytes patagonicus*) swimming underwater. Photo by Kevin Schafer



NOTES NEWS

ANIMAL NEWS

While we are saddened by the passing of Hsing-Hsing, the beloved panda who died November 28, there is also cause for celebration at the National Zoo these days. The last few months have seen a number of births here, as the Zoo's cycle of life continues to spin.

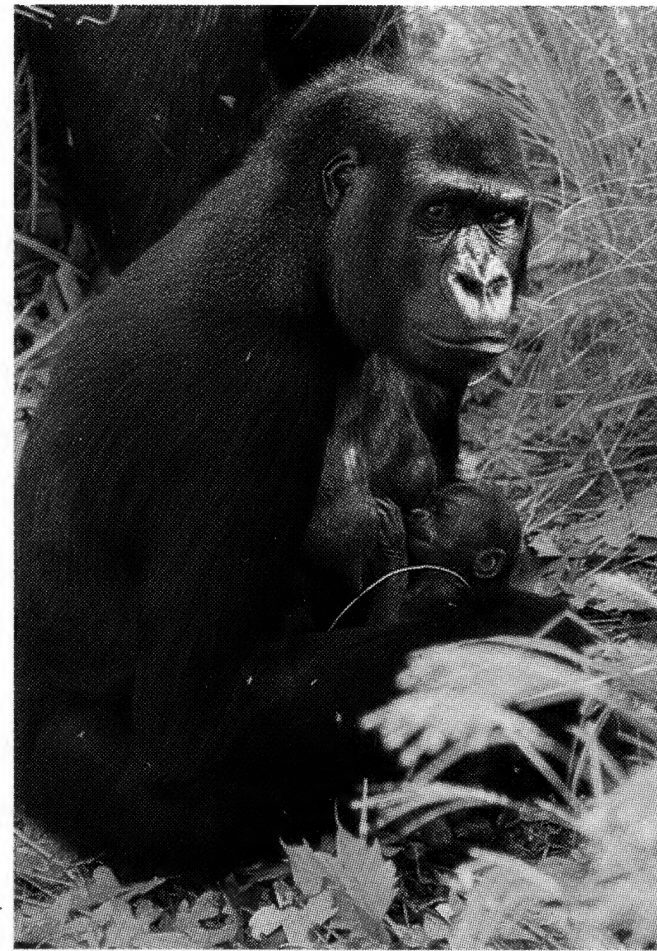
Several newborn primates came into our world last fall. The Small Mammal House has become a virtual nursery for tiny monkey babies, including the golden lion tamarin twins (*Leontopithecus rosalia*) born on October 4 in their free-ranging Beaver Valley exhibit, as well as a Geoffroy's tufted-eared marmoset (*Callithrix geoffroyi*) born on October 25 and a pale-headed saki monkey (*Pithecia pithecia*) born on November 4.

Elsewhere you'll find larger primate babies. On October 13, a white-cheeked gibbon (*Hylobates concolor*) was born to mom, Siam, and pop, Ralph, and can be seen hanging onto Siam in the gibbon exhibit. Another gibbon was born



JESSIE COHEN/NZP

to Mae and Bert on December 12. Babies of this species are born blond, then turn black after one year. Adult males stay black, but females turn back to their original coloration upon maturity. A six-year-old female at the Zoo named Maya is just now changing from her juvenile black to her adult blond—which gibbon gentlemen prefer. White-cheeked gibbons, so-called "lesser apes," inhabit the rainforests of Laos, Vietnam, and southwestern China. Their monogamous pairs stick together, and sing together (see Valentine's Day article on page 16).



JESSIE COHEN/NZP

In equally great ape news, an infant western lowland gorilla (*Gorilla gorilla gorilla*) was born November 20 to Mandara and Kuja. A mother now four times over, Mandara, 17, gave birth to the male baby right in front of amazed visitors at the Great Ape House. For Kuja, 16, it was his first offspring as the new silverback male in the group. A total of nine gorillas, forming two groups, now live at the Zoo. All three subspecies of gorilla are endangered in the wild.

BABY WHITE-CHEEKED GIBBON (LEFT).
MANDARA WITH HER NEWBORN INFANT.

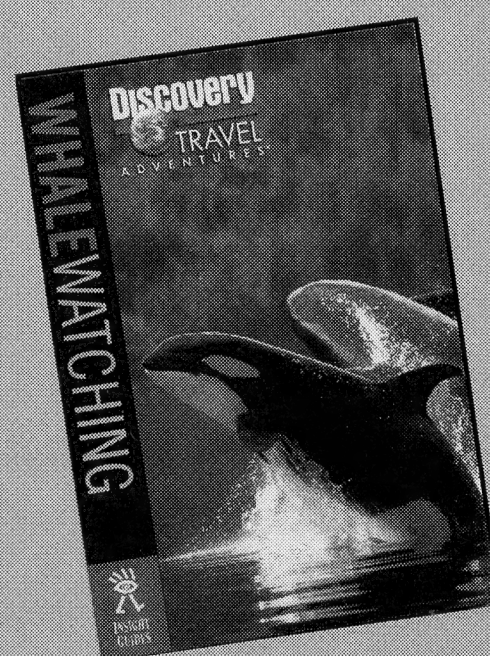
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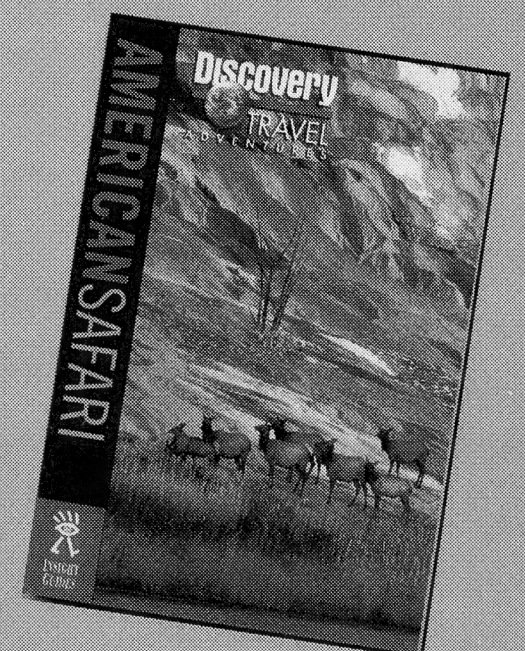


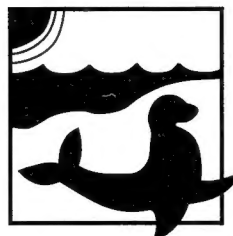
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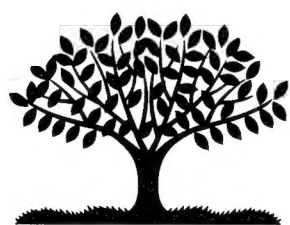
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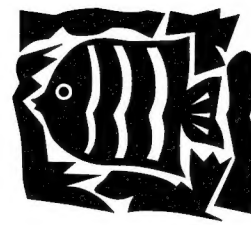
Seal Days:
March 18-19



African-
American Family
Celebration:
April 24



Science &
Technology
Days:
April 29-30



Guppy Gala:
May 12



Frog
Fandango
(ZooFari):
May 18

SPRING HIGHLIGHTS

Hard as it is to believe, soon it will be spring—a busy time at the Zoo, not only for animal births and floral awakenings, but for FONZ and Zoo events. Mark your calendar for the above happenings here at the Smithsonian National Zoo.

In addition to our festive events, the National Zoo will also host a number of lectures on zoological and conservation topics in the coming weeks. On **JANUARY 27**, author Mark Pendergrast will delight java enthusiasts with a discussion of his new book *Uncommon Grounds: The History of Coffee and How It Transformed the World*. Smithsonian biologist Don Wilson will discuss his latest book on North America's mammals on **FEBRUARY 10**. Paleontologist Michael Brett-Surman will detail dino digs, and his new book *Dinosaurs for Adults: How to be Smarter Than Your Kids*, on **FEBRUARY 24**. Randall Eaton will continue the teeth-gnashing on **MARCH 9** with a discussion of his latest book *The Human Carnivore*. Each lecture takes place in the National Zoo Visitor Center, and begins at 8 p.m., preceded by book-signings at 7 p.m.

WINTER WONDERLAND

The chill of winter may discourage many visitors from touring the Zoo, but those that do come will find a wide array of animals not just inside, but out. All manner of tropical mammals and birds—from Sumatran tigers and Malaysian tapirs to American flamingos (whose outdoor pool is heated to 68 degrees Fahrenheit)—will brave all but the harshest elements, despite not being specifically adapted to our temperate mid-Atlantic winters. If you don't believe it, come and have a look for yourself!

The Zoo also offers an easy get-away from the cold inside its exhibit buildings. Those of you who long for the humidity of the jungle (but can't afford the airfare to Iquitos or Rio) will find tropical pleasures inside the Amazonia building, heated to 78-80 degrees Fahrenheit daily, or the equally toasty Pollinarium. The Reptile Discovery Center also welcomes visitors seeking warmth amid the building's cold-blooded denizens. Linger awhile by the Cuban crocodiles and Australian snake-neck turtles before returning outside to wintery Washington.

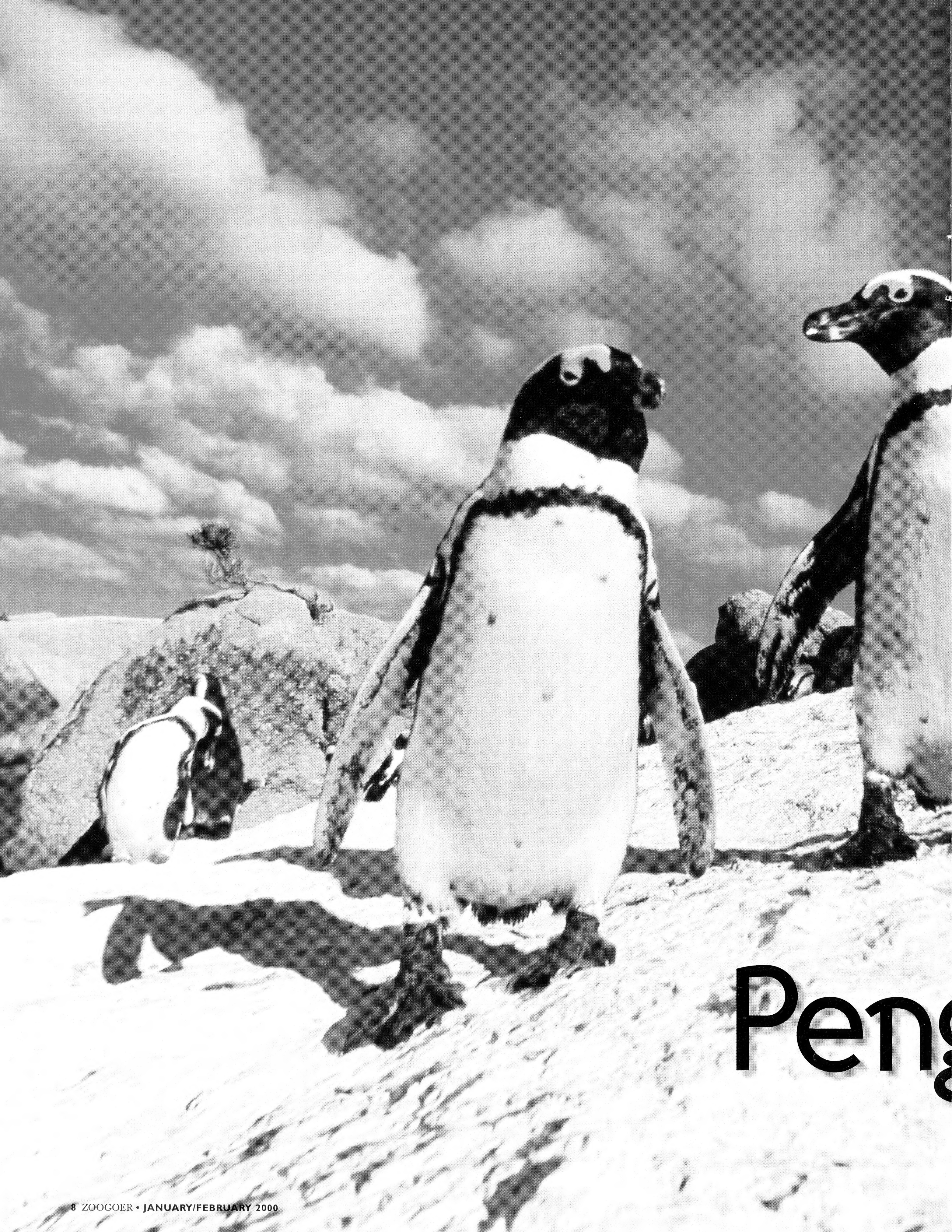
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Peng



BY HOWARD YOUTH

Each year many thousands of tourists watch penguins swim in a narrow pool set into the Flamingo Hilton's 15-acre courtyard. From the 20th floor of this Las Vegas colossus, the black-backed birds look like mermaids doing laps in a puddle. Strange as it may seem, the Americans watching these show-birds far outnumber those who trek to see the penguins' millions of wild cousins. Weird, but understandable. After all, wild penguins live far outside our easy reach. To see most of the species, you incur great expense and endure long airplane flights and choppy boat rides, not to mention brave icy winds or searing sun.

guins on Thin Ice

PHOTOGRAPHS BY KEVIN SCHAFER

AFRICAN PENGUINS
(*SPHENISCUS DEMERSUS*).

Still, penguins are favorites.

"Because their legs are set so low down on their bodies, penguins stand upright," writes penguin researcher Pauline Reilly in her book *Penguins of the World*, "and perhaps it is this similarity to ourselves that makes penguins so attractive to people." They remind us of awkward waiters in tuxedo plumage, waddling around, flapping their ungainly flipper-like wings. Images of penguins as clumsy, cuddly humanoids appear in cartoons and on air conditioner ads and ice cream trucks.

But in the wild, far from slot machines, newsstands, and aquariums, penguins lead very birdy lives, albeit in often outlandish circumstances. They defend territories, dive for food, feed their young, commute from nests to the sea, and avoid, as best they can, getting torn to shreds by predators. Real-life penguins—as scientists are only now beginning to learn—are far more compelling than their cute cartoon facsimiles.

The adaptations that set penguins apart from most other birds enable them to thrive in harsh environments where few other creatures can survive. Antarctic penguins even lack the mites and lice that plague many of the world's birds—it's just too cold out there. Within this fascinating family, the world's 17 penguin species vary widely in size, habitat, and diet, but also in habits. Unfortunately, just as varied are the threats facing penguin populations.

From the Equator to the Bottom of the World

Depending upon which etymology you choose to believe, the word "penguin" derives either from the Latin word *pinguis*, meaning fat, or the Welsh words *pen gwyn*, meaning "white head." Both names probably first described a flightless bird that is not a penguin at all—the now-extinct great auk. The great auk, a relation to the flying puffins and other auks alive today, was harvested to extinction for its fat by 1844. Before then, the black-and-white seabird was familiar quarry for people living along North Atlantic coasts. Neither auks nor penguins had white heads, but fishermen weren't necessarily focused on such details, so

most etymologists stick to the Welsh words as a probable origin for the name. European explorers probing mysterious southern waters stumbled upon true penguins as early as the late 1400s, when the first penguin reference was penned off Africa's southern coast during one of Vasco da Gama's voyages. Today, scientists refer to birds as penguins only if they belong to the family Spheniscidae—the only flightless aquatic birds. The family name comes from the Greek word for wedge, referring to the penguin's curved flipper-wings. (See "What's in a Name," page 30.)

The oldest known penguin fossil dates back 50 to 55 million years, and 32 extinct penguin



INTRODUCED LIVESTOCK CAN DESTROY NESTING HABITAT FOR PENGUINS.

species have been identified, including some bruisers that probably weighed up to 300 pounds—more than a giant panda. Although no missing link has been found, scientists believe penguins descended from flying relatives. Genetic analysis reveals that penguins' closest relatives may be the highly aerial frigatebirds and the deep-diving loons, which certain penguin species resemble when they swim with their necks and backs exposed above water.

No penguins live north of the Equator, but one species lives on it. Native to the sun-baked Galapagos archipelago, the Galapagos penguin, a small black-and-white bird with a pale orange bill locked in what looks like a perpetual grin, leaves the hot shore by day to scour the cold Cromwell Current for fish. At the other extreme, the emperor penguin, a husky black-headed bird

splashed with dollops of orange on its neck and a wash of yellow on its breast, breeds in the middle of Antarctic winter on ice, and never walks on land. Standing almost four feet tall and weighing up to 90 pounds, the emperor is the world's largest penguin, dwarfing the world's smallest, the pigeon-sized blue, or little, penguin of Australia and New Zealand (which despite its bluish gray back is the least colorful of the lot). Contrary to popular belief, more than half of the world's species of penguin never set foot on mainland Antarctica.

Whether living along the coasts of South America, southern Africa, Australia, New Zealand, or Antarctica, all penguins must leave the cold seas to molt and nest, and they must live near cold waters rich in their favored foods—fish, squid, and small shrimp-like crustaceans called krill.

Feast and Famine

Like the seals, sea lions, and whales with which they share the seas, penguins are supremely adapted for a marine existence. The land offers no sustenance to penguins. They thrive on the seas' bounty. Penguins of some species spend 75 percent of their lives at sea. Equipped with keen underwater vision, penguins hunt both day and night. Their sleek plumage, torpedo-shaped bodies, and flightless flipper-like wings, driven by well-developed breast muscles, make them excellent fishers. Tightly packed feathers—up to 70 per square inch—and blubber insulate the diving birds.

Penguins, for all their awkwardness on land, epitomize grace and power under water. They fly underwater with powerful wing strokes, diving, careening, grabbing prey, and avoiding a mixed bag of predators, including sharks, killer whales, sea lions, and leopard seals. Penguins dart through the sea at speeds up to 15 miles per hour. Penguins of many species also "porpoise," briefly shooting above, then below the surface in a roller-coaster-like motion.

Scientists do not fully understand the penguins' underwater feeding tactics. They do know that the birds often dive deeply for their prey, thanks in part to heavy, solid bones that help them sink as they dive. (Flying birds have





The oldest known penguin fossil dates back 50 to 55 million years, and 32 extinct penguin species have been identified.

more or less hollow bones that lighten their payloads.) Most penguins rarely dive deeper than 30 feet, but the heavy emperor penguin holds the record at over 130 feet, and may stay submerged as long as 18 minutes at a time. Penguins catch prey headfirst in their forceps-like bills, then swallow their food, which is grasped firmly within the mouth by rows of sticky bristles. In the black depths, deep-diving penguins probably spot the glow of their krill, fish, and squid prey thanks to the small animals' bioluminescence.

Penguins' dark-above, light-below coloration serves to hide or advertise them underwater, depending upon which theory you like. Many scientists believe the penguins' pied coloration hides them from predators and prey. When seen from above, penguins' dark backs meld with the sea's

depths; when seen from below, the birds' white bellies blend with the light-enriched waters above. Others theorize that a pied penguin's striking plumage distresses schooling fish, causing them to separate and become easier to capture.

Many penguins hunt alone, but others, especially those that feed upon fish, hunt in groups. For instance, Galapagos penguins hunt in groups of up to 200 individuals. African, or jackass, penguins and South America's Magellanic penguins often join predatory fish, other seabirds, or sometimes sea lions for feeding frenzies targeting small schooling fish.

Penguin Cities

When it comes to nesting, New Zealand's yellow-eyed penguins are usually loners—and they stand

out as such among the otherwise gregarious penguin family. These brightly colored birds, with gaudy yellow eye bands and faded yellow crowns and throats, nest out of sight of one another amid dense vegetation on coastal and island slopes.

But elsewhere in the penguin world, nesting is a group activity and penguins rank among the most social of birds. Many species nest in huge colonies that blanket large stretches of terrain. The colonies cover acres of ground with stinking guano, blotting out most of the vegetation that once grew there. Yet penguins are a combative lot, protecting tiny territories whose boundaries are within pecking distance of their nests. In dense colonies, penguins returning from the sea must run a gauntlet of nips and jabs on the way to their nests. Those pairs nesting at the outer



KING PENGUINS (*APTENODYTES PATAGONICUS*) LITERALLY FLY UNDERWATER.

colonies cover the landscape. On such open colonies, nests consist of scraped depressions lined with small rocks, bones, or grasses. Pairs often fight over stones, precious nesting materials that are regularly stolen by neighbors. In areas where all three of these species mingle, varied behaviors probably reduce competition for nest sites and food. For instance, Adélies often place their pebble-lined nest depressions on higher ground than the less numerous gentoos. When feeding, Adélies tend to catch smaller krill, chinstraps larger ones, while gentoo eat krill that vary in size depending upon region.

The penguin giants—the emperor and somewhat smaller king penguins—don't build nests at all. Unlike other penguins, which usually lay two eggs, these birds lay a single egg that is incubated under skin folds between their legs. The eggs rest on the birds' legs, and can be shuffled along the ice or ground for short distances.

While most penguin species split parental duties equitably, male emperors take the penguin prize for parental sacrifice. Many species nest near productive waters during warm months, but not emperors. The males nurture their eggs on their feet on distant ice fields, in the dead of the Antarctic winter. Female emperors lay their single eggs in May, the beginning of Antarctic winter, immediately passing them off their feet to their mates for safekeeping. Females tromp off for distant shores to feed, only returning to relieve their mates after the eggs hatch, some nine weeks later. Blasted by fierce winds and subzero

edges of the colony receive fewer pecks but pay the price by being more vulnerable to such loitering nest looters as the gull-like skuas and giant petrels.

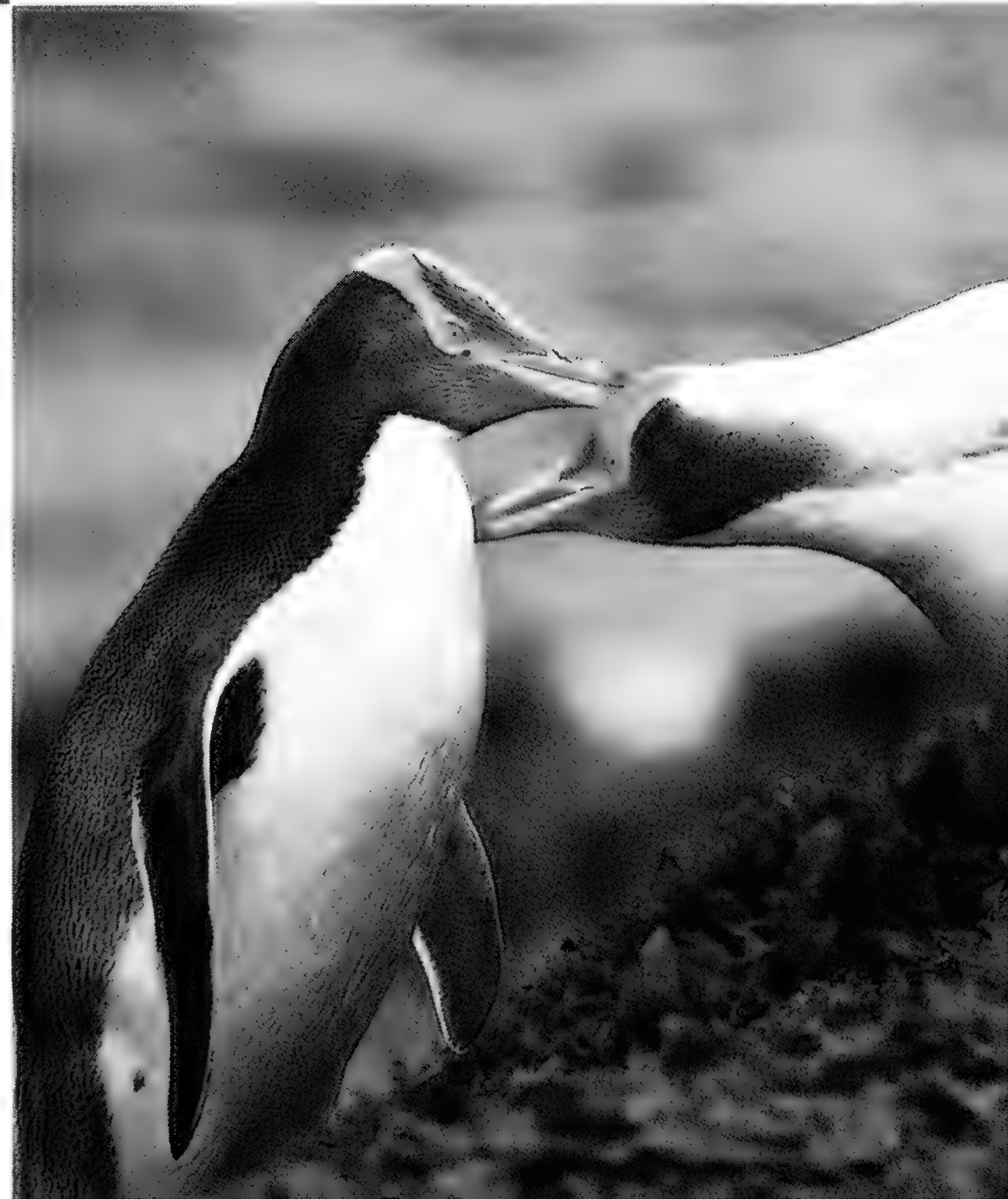
Like teens at a prom, courting penguins often follow the rhythms of the group. Penguins generally return to the same colonies year after year, where they seek nest sites and mates. Males and females of a few species, notably the short-billed, tuxedo-plumaged Adélie of Antarctic ice floes, and the blue penguin, usually take the same mates and nest sites each season.

Males usually return to the colony first, followed shortly after by females. For the four subtropical and tropical species—the Galapagos, African, Magellanic, and Humboldt penguins—this means returning to underground burrows,

cracks, or caves that shelter nesting pairs from the scorching sun and land-based predators. These birds nest at any time of year, depending upon food availability. The fiordland penguin nests under tree roots in coastal rainforests of New Zealand.

Recognition is key for a pair's survival and the survival of their offspring. Pair bonds form quickly, and mates recognize each other by wing-flapping, neck-raising, and other displays. Such exuberance is contagious. Often when one pair starts to greet, the excitement ripples through the colony, as if the birds are doing a strange form of the wave.

In the icy waters near Antarctica, Adélie, chinstrap, and gentoo penguins emerge and return to rocky open areas, where huge



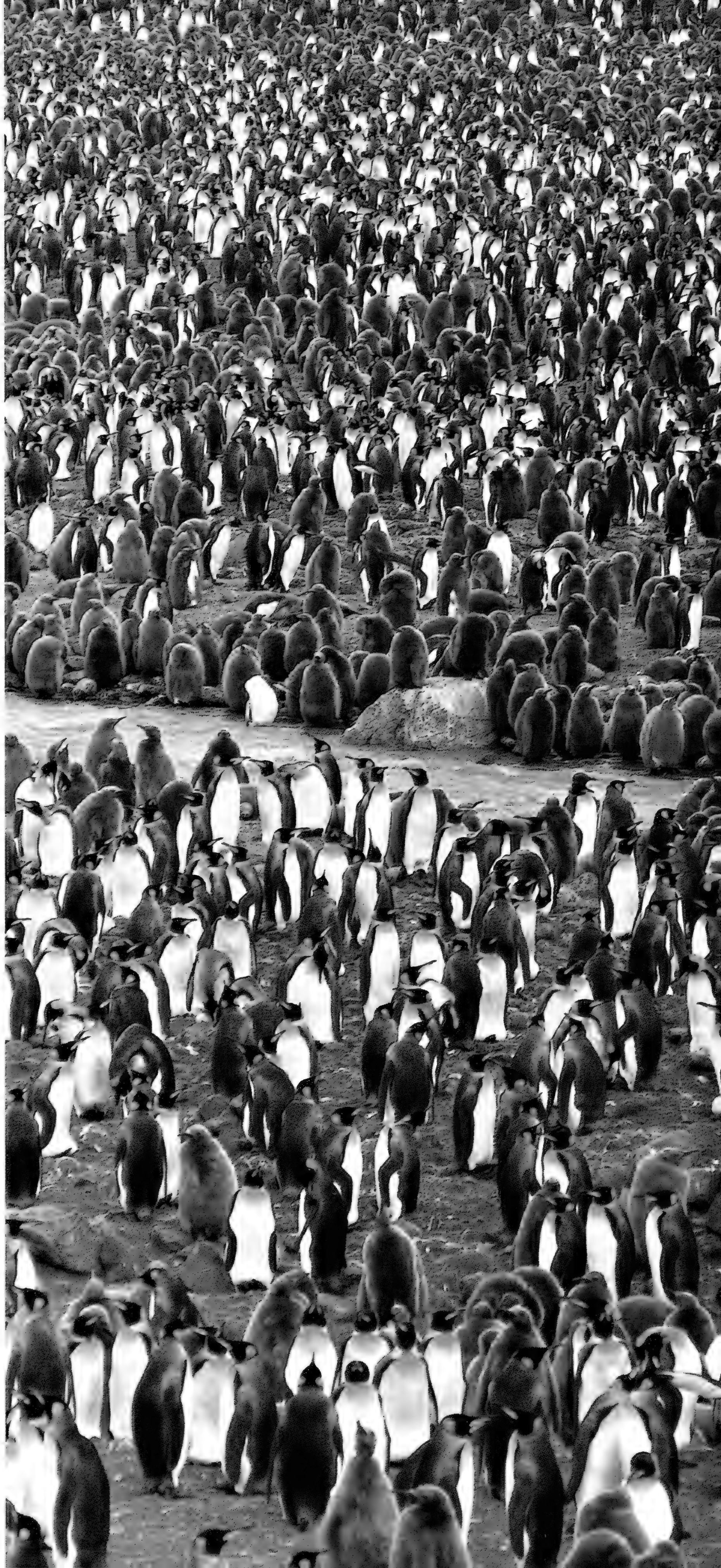
NEW ZEALAND'S YELLOW-EYED PENGUINS (*MEGADYPTES ANTIPODES*).

temperatures, incubating males don't defend nesting territories. Instead, they huddle together, all the while keeping their eggs on their feet and under their warming skin folds. Upon hatching, young emperors may receive a small meal of regurgitated "penguin milk," a curd-like substance, from their long-fasting fathers. Females return shortly after, their stomachs filled with fish and squid that they will regurgitate for their young. Relieved at last, males begin their long commute back to the sea to feed, and then return again to feed their young, which fledge at about five months old. Like war-weary soldiers passing fresh recruits, long lines of dirty, hungry parents plod to the sea, streaming past recently cleansed and fed penguins marching back to their young.

The business of returning to land, courting, mating, and incubating eggs forces penguins to fast for long periods each year. Fasting lengths vary depending upon species and the distance from nests to feeding waters.

Between nesting and commuting, the male emperor may go without food for up to six months. In contrast, other species undergo nesting fasts of a few days or weeks. Emperors also hold the distance record for flightless bird travel: Adults waddle or toboggan—sledding on their bellies, using the toes to push and wings to steer—up to 125 miles between open fishing waters and their icy nesting grounds.

All penguins share the duties of brooding, or sheltering, their nestlings from weather and predators. After three or four weeks, young penguins begin to keep themselves warm. This allows both parents time to leave the nest and gather more food for their fast-growing progeny. With their parents gone for long stretches, young penguins of some species, including emperors, kings, Adélies, and gentoos, seek the protection and warmth of their peers, forming groups called crèches. When parents return from feeding expeditions, they enter the gaggle of clamoring young to find and feed, via regurgitation, their offspring. Researchers have found that adults and young birds give individualized calls that help them find each other in a crowd. Depending upon the species, young penguins stay in crèches for between seven weeks and nine months before taking to the sea. In general, young penguins wander widely, returning to nesting colonies to breed after two to eight years.



Penguins generally return to the same colonies year after year, where they seek nest sites and mates.

Waddling into the Future

Penguins face a multitude of threats to their survival.

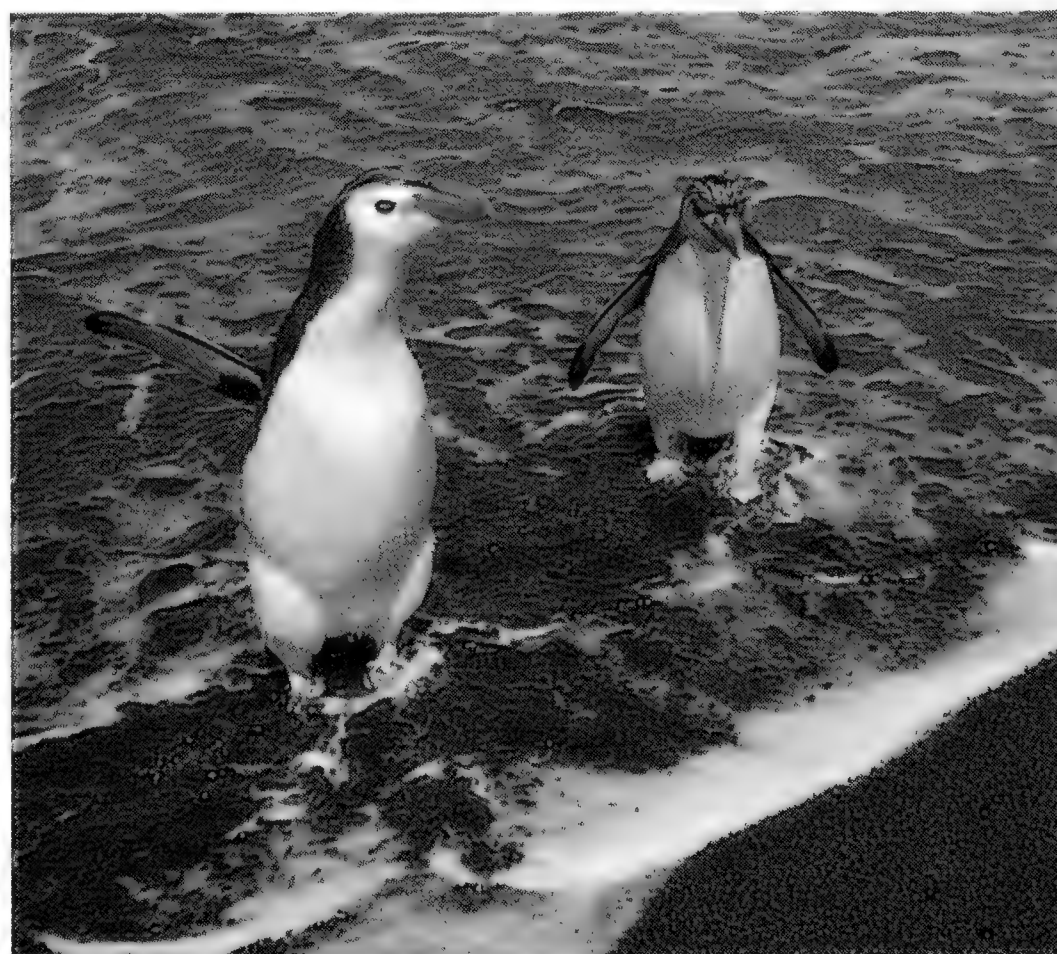
In 1996, a conference on penguin conservation was held in Cape Town, South Africa. Under the auspices of the World Conservation Union (IUCN) and other groups, penguin researchers from ten countries met and began work on the Penguin Conservation Assessment and Management Plan. They assessed the status of the world's penguins and began charting conservation strategies for their future. The workshop's report, published in 1998, states that "Of all the penguin species, only those in the Antarctic do not seem to be facing grave, documented declines or other problems that put them at serious risk." But even in the Antarctic, penguins face certain threats. Commercial fishing fleets deplete the penguins' food supplies, tourist groups disturb colonies, and the close proximity of international research stations to traditional colony sites brings pollution and disruptive helicopter flights.

In other areas, introduced cattle, sheep, and rabbits destroy nesting habitat, while exotic predators take a heavy toll on eggs, young, and even adult penguins. In New Zealand, for example, introduced weasels, dogs, cats, pigs, and rats threaten fiordland and yellow-eyed penguins. Yellow-eyed penguins are considered vulnerable to extinction, with a total population of up to 6,000 birds. On several islands off New Zealand, the introduced weka—a flightless rail that is itself threatened by exotic mammals on New Zealand's main islands—preys upon the eggs and young of fiordland and royal penguins, two vulnerable species with localized distributions.

Dependent upon rich upwellings carried by cold ocean currents, penguins, like many other seabirds, can be devastated by changes brought on by meteorological phenomena. For example, El Niño can devastate South America's Humboldt and Galapagos penguin populations, replacing productive cold currents with infusions of warm water that leave the birds and their chicks to starve. Whether or not this phenomenon is on the increase could play a strong role in these localized birds' long-term prospects.

The endangered Galapagos penguin is the

world's rarest penguin and it became even more scarce following the 1982-1983 visit by El Niño, which cut its food supply and reduced its population from perhaps more than 10,000 to about 450 individuals. The population had not yet recovered when El Niño struck again in 1997,



TOP: MAGELLANIC PENGUIN (*SPHENISCUS MAGELLANICUS*).
BOTTOM: ROYAL PENGUINS (*EUDYPTES SCHLEGELI*).

causing penguin and other seabird colonies to fail again. Even without the threat of ocean current fluctuations, these island-bound birds are disturbed by tourists and fishing boats, and threatened by introduced dogs, cats, and rats.

Off the coasts of South Africa and Namibia, the African penguin has suffered steady declines—up to 75 percent during the 20th

century—due to commercial over-fishing, coastal industrial development, oil spills, introduced cats, and

competition with rebounding populations of Cape fur seals.

Meanwhile, the sizes of remote colonies of the Antarctic species—among the largest bird metropolises in the world—remain steady. Recent population estimates for these abundant birds include more than two million pairs of king penguins, 2.5 million pairs of Adélie penguins, 6.5 million pairs of chinstrap penguins, and 11.5 million pairs of macaroni penguins, birds whose gold crests resemble the long, curly "macaroni" hairstyle popular centuries ago. The emperor penguin population holds firm at between 135,000 and 175,000 pairs.

Scientists are concerned about the potential effects of global warming on Antarctic penguins and their icy domain, as well as how climate changes will affect the ocean currents that provide most penguin populations with their abundant food. Nesting in sensitive, often localized areas, and dependent upon fluctuating marine resources, penguins, like sea lions and other marine predators, may face serious troubles in the future.

Conservation measures are being stepped up to better protect some of the seriously declining species by eradicating exotic pests, protecting nesting islands, and minimizing the impact of tourism and fishing upon the birds. But much more needs to be learned about these birds and how best to conserve them.

Meanwhile, continent-bound North Americans can marvel at penguins in aquariums, or in Vegas. These waddling ambassadors unwittingly invite us to learn more in order to protect their wild brethren nesting on battered rocks, in lush forests, or on drifts that remain invisible to most of us. Z

Howard Youth, an avid birdwatcher himself, is a Contributing Editor to ZooGoer.

Photographer Kevin Schafer's upcoming book, Penguin Planet, can be previewed at www.kevinschafer.com

I think people should mate for life,
like pigeons or Catholics.

—Woody Allen, “Manhattan”

*Mandrills
are from Mars,
Lemurs
are from Venus:
Valentine's Day
in a
Darwinian
World*

BY ALEX HAWES

Men and women.
Women and men.
It will never work.

—Erica Jong



WESTERN LOWLAND GORILLA (*GORILLA GORILLA GORILLA*)

JESSIE COHEN/NZP



WHITE-CHEEKED GIBBON (*HYLOBATES CONCOLOR*)

JESSIE COHEN/NZP



ORANG UTAN (*PONGO PYGMAEUS*)

JESSIE COHEN/NZP



PEACOCK (*PAVO CRISTATUS*)

JESSIE COHEN/NZP



SIFAKA LEMUR (*PROPRITHECUS VERREAUXI*)

ALEX HAWES/FONZ



is soon the season of red roses and dark chocolate, a time for declarations of undying love. Noble beasts, many *Homo sapiens* aspire to faithfulness 'til death do us part. But does this dedication come naturally? Consider an excerpt from a recent episode of *The Oprah Winfrey Show*, essential material for research into the human animal. Oprah's frequent guest, self-proclaimed relationship expert Iyanla Vanzant, spoke with men about their cheating hearts:

OPRAH WINFREY: This is Ed here. He says that he's cheating—that cheating on women is in his genes...

IYANLA VANZANT: Is that true? Did you say that?

ED: I did say that.

VANZANT: Which gene? Do you mean gene or organ? (Laughter in the audience.)

ED: Gene...

VANZANT: Explain that.

ED: Okay, I have a father who loved women. He had a lot of relationships. As a matter of fact, he had like twenty-seven different kids by different women. (Audience hisses.)

VANZANT: Don't judge his daddy. You do not know his daddy. Hush your mouth...

ED: I didn't know my father either. What happened was...

VANZANT: (interrupting) How'd you know he had all them women?

ED: I—I learned this later on. I finally met him in my twenties. He separated from my mom when I was a little kid...

VANZANT: Why do you cheat?

ED: ...It's not really cheating. It's—you know—I, I, I like beautiful women.

VANZANT: I like grits, I don't eat them every day.

WINFREY: I do too.

VANZANT: I love grits...

ED: There is—there is a major difference between grits and women, okay.

VANZANT: I wouldn't know that.

ED: Oh, I know.

Like Ed, some of evolutionary biology's fiercest scientific advocates scoff at the notion of monogamy. Men, they say, are born promiscuous. Guys seek variety, gals dedication—or so the theory goes. The man on the street may find comfort in this hypothesis, that the hand of evolution blindly molded his wandering eyes. Women roll their eyes at such self-serving sentiment.

Ever since females got stuck with the egg, males have had the opportunity to shirk parental obligations and spousal loyalty. This is our legacy as animals. Yet it may not be our only legacy. Behavioral studies on primate sex roles have flourished in the last 25 years, gradually painting a more complex portrait of female strategies. Not only has this evidence finally brought the female half into models explaining hominid evolution,

it has broadened the range of choices considered natural for modern humans as a whole. Paternal care and monogamy too can bring Darwinian benefits to males and their offspring, recent behavioral studies suggest. Monogamous marriage may not be a biological aberration after all.



In his 1871 book *The Descent of Man and Selection in Relation to Sex*, Charles Darwin declared that the rules of natural selection, which serve flowers and finches, apply equally to humans. Man, Darwin found, is no different from a peacock; he struts his hour on the stage for the chicks. Darwin marveled at the adaptations

evolved through the male animal's struggle for access to females. But he never considered the costs.

Evolutionary biologists reduce sex to simple math. The sum total of biological existence equates with a single variable, reproductive success—the number of genes (bound up in packets we call babies) that one leaves to posterity. A male's reproductive success can potentially vary far more than a female's. Male animals, after all, can spread their numerous seeds far and wide, while females can produce only one expensive egg—and thus one litter—at a time. Whereas one Moroccan emperor is said to have fathered 888 children, few women can bear more than a dozen children in their lifetime.

But polygamy (or polygyny, the more specific

term denoting one male having several female mates) can have its drawbacks. Polygyny introduces risk, in essence, raising the stakes. Assuming the typical 50:50 sex ratios of most mammals, if one male has four mates, three males have none.

Animals don't normally accept celibacy—evolutionary failure—easily. Many male animals, from stag beetles to elephant seals, expend valuable energy besting one another in battle. Male Irish elk wielded 12-foot-wide, 100-pound antlers, which likely served to intimidate other males and to impress prospective mates. Their fossilized antlers now decorate the mantles of Europe's castles and country manors, for the Irish elk went extinct 11,000 years ago.

The elks' racks, it is believed, simply became too large. Struggling to nourish their mineral-hungry antlers and navigate those massive appendages through the dense forest, the overburdened males couldn't survive long enough for their antlers to fulfill their purpose of vanquishing rivals and winning mates. Steroid-pumped weightlifters and silicone-inflated swimsuit models should heed the Irish elk's lesson: Vanity's arms race can escalate to the point of tragedy.



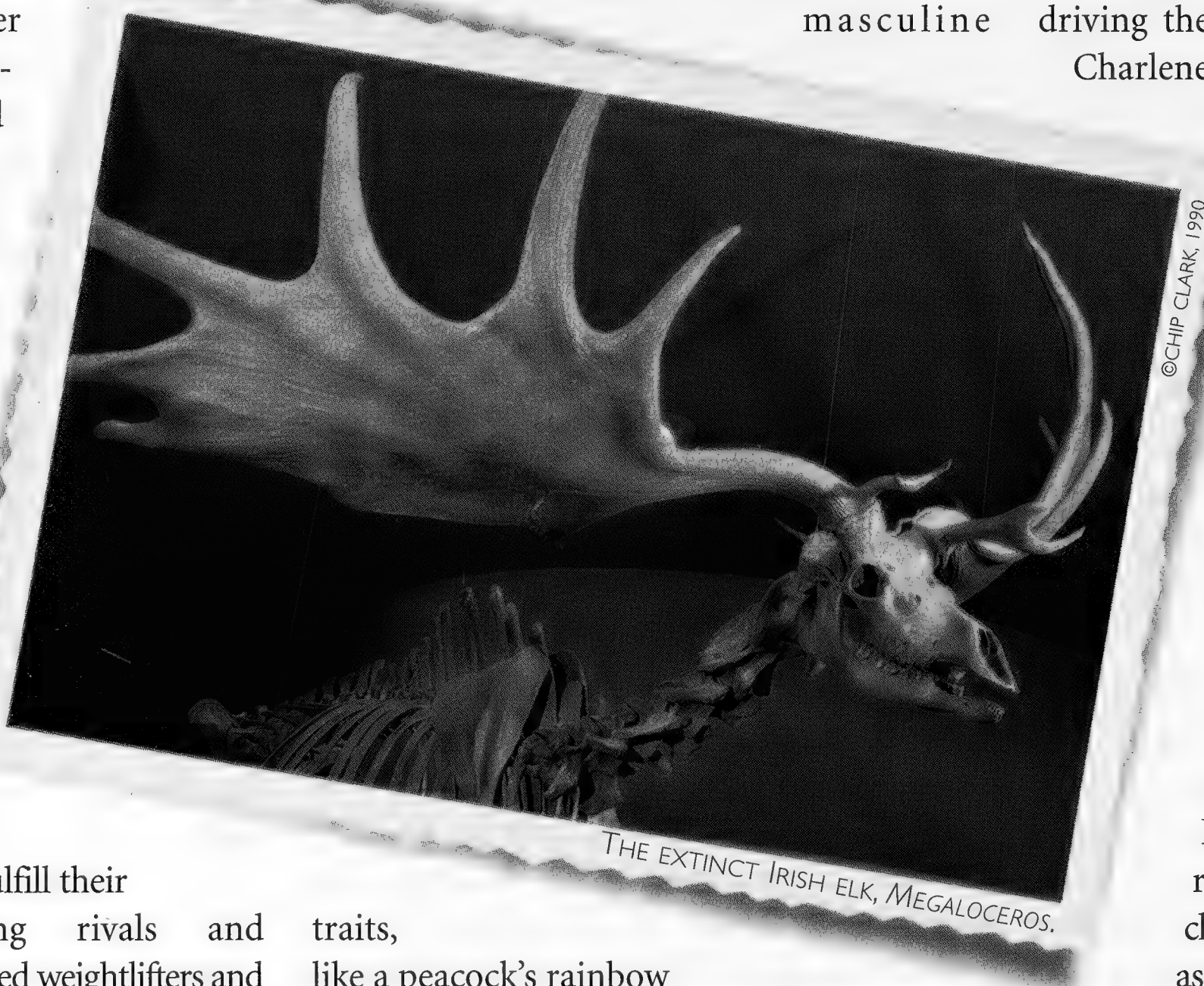
**Hoggamus, hoggamus.
Men are polygamous.
Hoggamus, hoggamus.
Women monogamous.**

—attributed to William James

Many feminists view Darwinian theories on sex with skepticism, or bile. Feminist theory often cloaks male dominance in terms of power, denying that significant biological differences exist between men and women. So-called "Darwinian feminists," like Sarah Blaffer Hrdy of the University of California–Davis and Meredith Small of Cornell University, have taken another

tack. Natural selection does shape human behavior, they say. But it emboldens women as much as men, and in ways that would surprise many testosterone-obsessed theorists.

The new thinking of Darwinian feminists was not entirely original. A short four years after Darwin published *The Descent of Man*, Antoinette Brown Blackwell politely questioned the author's objectivity in her own book, *The Sexes throughout Nature*. Blackwell admitted that Darwin had elegantly traced the evolution of masculine



THE EXTINCT IRISH ELK, MEGALOCEROS.

©CHIP CLARK, 1990

traits, like a peacock's rainbow of feathers or a mandrill's protruding canines. "But he seems never to have looked to see whether or not the females had developed equivalent feminine characters," she remarked.

Blackwell's critique went largely unnoticed for decades. Indeed, throughout the past century, the female animal time and again has been described as passive, even coy, in popular magazines and academic journals alike. The scientific basis for these presentations, however, has been stretched thin to cover preconceived notions of gender.

The study of behavior, whether that of furry monkeys or naked apes, suffers from one fatal flaw: observer bias. Researchers in the field admit to "physics envy"—jealousy over hard science's nanometer-thin precision. Behaviorists can't escape the demons of subjectivity.

Take your average cop. According to one study, police officers using radar flag male drivers 50 percent more often than female drivers. Yet when

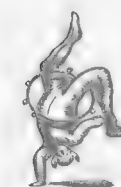
officers judge speeding with the naked eye, they pull over men 250 percent more often, the valid trend becoming quintupled through stereotyping.

Now consider your noble primatologist, lying on her back in the leech-infested underbrush of some festering jungle. Her binoculars are getting increasingly heavy to hold, the crick in her neck ever sharper, as she strains to discern the soap opera playing out in the branches 50 feet above. Suddenly, a monkey snatches a fig from another, driving the subordinate away. But was that Charlene or Charlie taking flight? It had

Charlie's ear tuft, but—no—he'd never get driven off like that. The researcher pencils a notch down for Charlene in the column "submissive behavior," and the encounter becomes further grist for the statistical mill. Yet it *was* Charlie who dashed off, tail between his legs.

Subconscious preconceptions can snowball into erroneous theories with unwarranted outcomes—as you may well explain to the traffic judge next time. Darwinian feminists scrutinize sex research for such subtle biases. No challenge delights them more than the assumption of female passivity.

Primatologist Sarah Blaffer Hrdy revived Antoinette Brown Blackwell's century-old critique in her landmark book, *The Woman Who Never Evolved*, published in 1981. Hrdy too challenged Darwin's assumptions. But now she had supporting evidence from long-term studies of primates and other animals. Doing the fairer sex a disservice perhaps, Hrdy showed that female primates can be just as domineering, backstabbing, and philandering as males.



To understand monogamy's place in human evolution, primatologists have sought out clues from our closest relations, monkeys and apes. The study of primates began, logically enough, where we hominids evolved: the plains of East Africa. There, large troops dominated by alpha males—baboons being the most well-known and well-

studied example—represent the norm. The savanna's long vistas allowed for easy behavioral observation by the early primatologists of the 1950s and '60s. Those same clear views allow dominant male animals to monitor their mates and rivals efficiently, making polygyny worth the initial fight for control.

But as the primatological record has become more complete, researchers have discovered a wealth of other social systems. Taken broadly, the female primate can be "dominant, subordinate, equal, or not interested," writes Hrdy.

On one extreme, some species interact only when absolutely necessary: when

mating. Even among the generally gregarious great apes, one species—the orang utan—flies solo. The immense, shaggy male, by virtue of size, has a hard time maneuvering through the trees; he sticks instead to the ground, encountering females only when looking to mate. And it is only in the orang utan, this unusually asocial primate, that forced mating is commonly observed. Rape, we should take comfort knowing, is not at all a requisite of primate life.

Sex roles can flip in primates too. In a few rare instances, females themselves rule the roost. Nowhere is this trait more common than on the island of Madagascar, where female lemurs reign supreme. Ring-tailed lemur females assert their

preeminence aggressively, driving males away from cherished fruits and tamarind pods. Female sifaka lemurs, however, dominate without a fight. Why? Sifaka females give birth during the dry season, when little food is available. Pregnancy and the ensuing demands of lactation push lemur mothers to the nutritional edge. Male sifakas, scientists speculate, defer peacefully so that their mates—and, more importantly, their potential offspring—might survive.

In species where females suffer fewer ecolog-

ternity elicits wider male support for a female and her infant—from the alpha male she's mated with publicly, and from any pretenders to the throne she's mated with surreptitiously.

Mating offers more than just a means of reproduction; sexual activity can stimulate group cohesion too. The bonobo (also known as the pygmy chimpanzee) takes promiscuity to the extreme. For bonobos, sex is a way of life, their version of the handshake. Bonobo researcher Frans de Waal estimates that 75 percent of bonobo sex

has nothing to do with reproduction—there's sex between males, between females, between juveniles, often to reduce tension over food

Primatologist Sarah Blaffer Hrdy showed that female primates can be just as domineering, back-stabbing, and philandering as males.

ical hardships, males can get away with less chivalry. But even in species characterized by female harems, such as mandrills and gorillas, male dominance doesn't mean absolute control. Females play the field, sneaking off for a tumble in the jungle with peripheral males. In chimpanzees, whose troops include multiple adults of both sexes, females disappear for days at a time. Genetic fingerprinting shows that more than 50 percent of chimps are fathered by males outside the troop.

That Moroccan emperor may have *thought* all those 888 children were his, but how many of his concubines were sneaking away to the pantry to cavort with the dapper prince? Ambiguous pa-

competition. Compared with the oft-barbarous common chimpanzee, there is little violence in bonobo societies.

Social roles in bonobos diverge sharply from those of their chimp cousins in many other ways. Groups of related bonobo females forage together; common chimpanzee females leave their natal groups before adulthood, joining unfamiliar troops in which females largely feed alone. Bonobo males—up against a united sisterhood—have little power over females; chimp males dominate ruthlessly, to the point of seizing and killing infants that aren't theirs. The two species both share nearly 99 percent of our genes. We have no greater genetic relationship to either, no evolu-

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tionary obligation to follow one system over the other.

Or to follow either.



Anyone who for even a moment thinks that what is natural is necessarily desirable has only to remember that 90 percent of all species that ever evolved are now extinct—through natural processes.... But the same perspective also lends an element of heroism and larger purpose to missions which aspire, despite the odds, to literally change the rules of existence.

—Sarah Blaffer Hrdy

Romantics may believe in monogamous marriage in principle. Whether spousal dedication runs deep in our DNA coils, however, remains less clear. While common in birds, monogamy is rare in mammals. But exceptions prove instructive, so consider this: Among our mammalian brethren, the primate order contains more monogamous species than any other.

Monogamy represents an exercise in mutual self-interest: If a male's offspring can survive only with his parental support, he's better off staying put. Helping one's genes survive, after all, matters just as much as spreading them. Females, in turn, should welcome the extra help of a faithful mate. Furthermore, monogamy offers an efficient means of reducing competition over food. A large group of unrelated animals tends to waste energy fighting amongst itself for access to food; monogamous family units have the advantage not only of smaller size, but of mutual self-interest.

While considered merely adaptive in evolutionary biology's cold calculus, primate marriages can warm a primatologist's heart. Researchers have witnessed titi monkey partners tying the knot—literally—as mates huddle together on a branch, tails entwined. Indri lemurs, ghostly black-and-white primates with haunting yellow eyes, get hitched too. The male indri, a true gentleman, defers to his mate and child while feeding, allowing them their choice of the finest fruits and flowers. And there's our swinging ape cousins,



Darwinian theory to its logical conclusion: explaining how and why we think. Old habits don't die, and the preconceptions of gender have reemerged in evolutionary psychology. Psychologist Steven Pinker, a pioneer in the field, has pronounced the male brain kinky, the female

brain clingy.

Pinker and other proponents of evolutionary psychology argue that the biology of the brain directs that more nebulous construct, the mind. Social roles emerge from our subconscious. The theory predicts that women will choose mates with the highest levels of testosterone (the muscle-men and masters of the corporate universe), while men's brains will turn on to the sight of ideal female traits (hourglass figures, bee-stung lips, full breasts)—characteristics that hypothetically help one's partner survive, and in turn produce and provide for healthy children.

Primate studies, however, tell us that no single sex-role scheme prevails. Evolution through natural selection involves occasional mutations—changes to the gene pool offering novel solutions to life's challenges. Social systems evolve through variation too.

Be faithful or don't be, it's ultimately your choice. Like orang utans, we humans can lead lives of silent solitude, passing each other like ships in the night. We can hop from bed to bed like bonobos, our children's paternity verified only through DNA analysis.

Or we can mimic the true romantics. Like gibbons we can sing sunrise duets, broadcasting our mutual devotion across the jungle canopy. Like titi monkeys we can snuggle, sitting in a tree.

K—I—S—S—I—N—G. Z

Alex Hawes, Associate Editor of ZooGoer, will tie the knot this summer with his lovely bride-to-be, Rachel.



the gibbons, whose partners sing siren-like duets at dawn to announce their family territory to the world.

Monogamy offers us hominids a solution to that eternal challenge: child-care. Human babies are among the most dependent of any primate infant, a side-effect of our evolved intelligence and erect posture. With expanded skulls requiring passage through birth canals narrowed by our bipedal anatomy, brainy babies must leave the womb at an earlier developmental stage than our primate cousins. Even after nine months, we enter the world premature.

Because human babies require constant nurturing over a prolonged period of infancy and childhood, a second provider and protector—the father—can help ensure his offspring's survival to maturity. While paternity in polygynous species remains uncertain, and fatherly behavior rare, the monogamous man knows his parenting efforts aren't for naught—provided, of course, his partner has been faithful too.

Dedicated mates produce healthier babies, more promising packages of DNA. Monogamy can win Darwin's game.



Yet just when it looked safe, a new field of study—evolutionary psychology—has emerged, bent on dividing the sexes again.

This amorphous field, which claims pieces of anthropology, biology, and psychology, has guided



CUR



BROWN TREE SNAKE (*BOIGA IRREGULARIS*)

ING GUAM'S SNAKE EPIDEMIC

BY TIM STODDARD

Five steps inside the door of the National Zoo's Bird House, behind a thin veil of netting, two unlikely roommates bed down next to each other. Horatio, a diminutive, dark-plumaged Guam rail (*Rallus owstoni*), excavates a small pit next to a large plastic box in which Sid, a nine-foot-long brown tree snake (*Boiga irregularis*) basks angelically. It's an ironic image of prey coexisting with an alien predator, like the lion lying down with the lamb. Sid—named after Sid Vicious, the late guitarist of the British band The Sex Pistols—flicks his tongue like a true punk-rocker, inches away from the rail. Naïve Horatio pecks at the plastic inquisitively, oblivious to any potential danger.

Since they were accidentally introduced to Guam in the late 1940s, brown tree snakes (BTS) have decimated the island's endemic bird and reptile population, causing the local extinction of five lizard and nine bird species, including the Guam rail. The snakes aren't simply a nuisance, they're an ecological and economic nightmare. Every time the sun sets over the western Pacific, more than a million brown tree snakes emerge from their daytime hideouts on Guam, prowling secluded forests as well as residential neighborhoods.

Horatio and Sid's peculiar housing arrangement serves to educate visitors about the impact of the brown tree snake on Guam's birds. What zoogoers don't see, however, are the dozens of brown tree snakes living in a room in the Zoo's pathology department. The typical BTS on Guam is shorter and skinnier than the well-fed Sid, with coloration that varies from yellowish green to darker browns and grays. Donald Nichols, a veterinary pathologist for the National Zoo, has collected these snakes from Guam on seven

occasions—most recently in November 1999. Nichols transports the snakes back to Washington to learn how they react to certain snake-specific viruses. It now appears that Nichols and a collaborating biologist, Elaine Lamirande, may have found an elegant solution to Guam's BTS epidemic: Make the entire brown tree snake population on Guam sick.

When Guam was occupied by the Japanese during World War II, a U.S. bombing campaign razed most of the island's infrastructure. In the post-war reconstruction, Guam imported large shipments of lumber from New Guinea. It is believed that brown tree snakes, which are native to New Guinea, northern Australia, and the Solomon Islands, were stowaways on these shipments.

The brown tree snake's silent invasion of Guam didn't draw much attention until the mid-1970s, when the U.S. Fish & Wildlife Service (USFWS) realized that several endemic bird



JESSIE COHEN/NZP

ZOO-BRED GUAM RAIL.

species were declining at an alarming rate. Biologists initially guessed that a mysterious disease was ravaging Guam's birds. But in the early 1980s, Julie Savidge, then a staff biologist at the Guam

Division of Aquatic and Wildlife Resources (DAWR), discovered that the snakes were the culprits. Further surveys revealed the severity of the BTS problem: Guam's forests were seething with as many as 14,000 individuals per square mile in some areas.

Like countless other introduced pests, the BTS is far less abundant in its native range, where it has to compete with other predators for limited resources. Guam, however, offered all the right



ELAINE LAMIRANDE/NZP

THE BESIEGED ISLAND OF GUAM.

Since they were accidentally introduced to Guam in the late 1940s, brown tree snakes (BTS) have decimated the island's endemic birds and reptiles.

conditions for a BTS population explosion. Small introduced geckos and skinks are ubiquitous on Guam, supplying young brown tree snakes with a steady food supply that sustains them until they can move on to larger prey. The island's endemic birds evolved in a predator-free safe haven that

didn't select for the evolution of any of the defensive behaviors that snake-wary birds exhibit. While diurnal Guamanian birds sleep, nocturnal brown tree snakes raid their nests, taking eggs, chicks, and adults like candy from a baby. At the Zoo, when Horatio sleeps inches away from Sid, he isn't brazenly flirting with death—his neural circuitry simply doesn't recognize the large snake as a threat.

The BTS poses far less a threat to Guam's human population. Unlike rattlesnakes, the BTS does not have large, hollow front fangs that simultaneously pierce the skin and deliver a venomous cocktail. Instead, the snakes latch onto their prey and chew until their rear fangs have opened a small wound. Weak venom drips down

from modified salivary glands at the back of the mouth and flows into the open wound. The venom subdues the prey while the snake slowly



USDA/APHIS

THE USDA'S REPTILE-SNIFFING TERRIERS.

squeezes the victim to death or eats it alive.

Nichols, who catches his study snakes by hand, has been bitten on several occasions, and claims that the bite is no worse than a bee sting. With readily accessible medical care on Guam, none

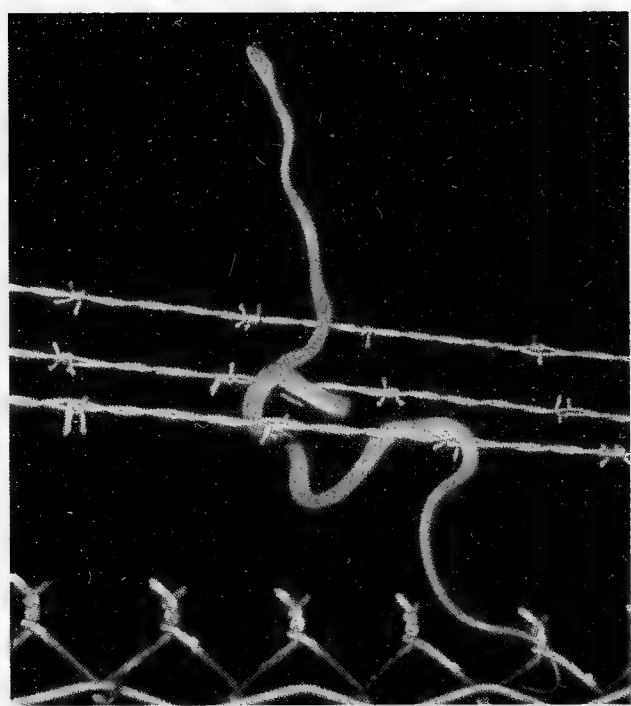
of the 200-plus cases of BTS bites there have caused more than discomfort in adults. Nevertheless, in several instances infant victims have allegedly gone into respiratory arrest before medical treatment relieved their symptoms. Guamanians tell horror stories of waking in the middle of the night to find a BTS wrapped around a screaming baby. The snakes are only following their instincts, of course, probably mistaking the crib for a nest and the infant's small hands and feet for squirming chicks.

Public health and ecological issues aside, brown tree snakes are a considerable economic burden on Guam. Following their tree-climbing instincts, the snakes spiral up power poles and across electric lines, causing short circuits that

trip off power outages on average once every four days. Living with these outages is not cheap, what with the cost of repairing damaged power facilities, replacing downed computer systems, and restocking perishable foods.

Along with their penchant for powerlines, BTS naturally seek out small hiding spaces, which often include cargo containers at airports and harbors. As a result of Guam's high-volume of outbound ship and air traffic, BTS are frequently transported to far-flung locations, including the Federated States of Micronesia, Okinawa, Diego Garcia (a remote island in the Indian Ocean), and, in one case, Corpus Christi, Texas. The snakes have already colonized the island of Saipan in the Northern Marianas, and, with daily flights from Guam to Honolulu, there's an imminent threat of them arriving in Hawaii, a state already reeling from the demise of native species. From 1981 to 1994, six BTS were found dead or dying near runways at Honolulu International, sometimes hiding in the wheel wells of jumbo jets or in sealed cargo containers. An additional seven were captured alive in a military warehouse several miles from the airport.

Female brown tree snakes may be able to store sperm for several months to delay fertilization until environmental conditions are ideal, so, in theory, a



BTS SCALING A FENCE ON GUAM.

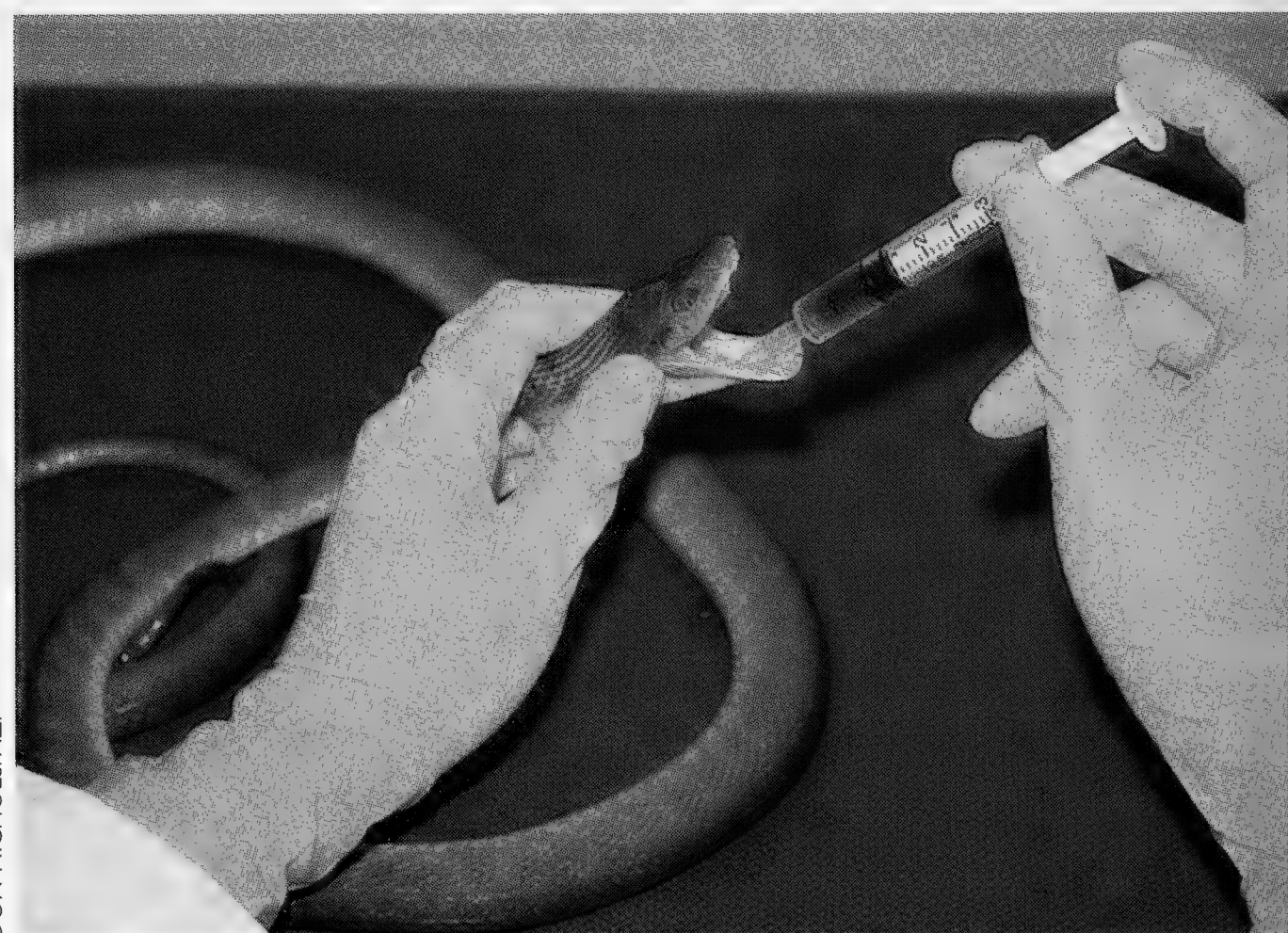
USDA/APHIS

single female snake could arrive in Hawaii and establish a new colony. Even with Hawaiian officials inspecting all aircraft from Guam with sharp-nosed, reptile-sniffing beagles, it's likely that a few brown tree snakes will settle in Hawaii.

In an effort to quarantine

the

BTS, the USDA has set out an extensive trapping system around the perimeters of military and commercial airports on Guam. The traps haul in about 6,000 snakes each year, keeping most of the snakes off of aircraft. But the traps have virtually no effect on the overall BTS population, which has reached two million individuals by some estimates. Thirty years ago, a trapping program might have



ADMINISTERING A STRAIN OF PARAMYXOVIRUS TO A CAPTIVE BROWN TREE SNAKE.

DON NICHOLS/NZP

Following their tree-climbing instincts, the snakes spiral up power poles and across electric lines, causing power outages on average once every four days.

taken care of the burgeoning BTS population. But today, like a raging infection, there are simply too many snakes for this kind of cure.

Don Nichols learned of the brown tree snake problem in the early 1980s, while completing a post-veterinary school pathology residency at the Zoo. At that time, the wild populations of Guam's endemic rails and Micronesian kingfishers (*Halcyon cineromina*) were so close to extinction that the National Zoo's Scott

ing the distantly related viruses responsible for mumps, measles, and canine distemper. When infected with a paramyxovirus, snakes exhibit flu-like symptoms, usually involving mucus discharges from the nose and mouth, laryngitis, and pneumonia, that often progress to death. Nichols is quick to emphasize, however, that these snake viruses are only distant relatives of human pathogens. Temperatures above 95° F inactivate these viruses, making it impossible for them to survive at the body temperature of mammals or birds.

The epiphany came to Nichols one day while separate thoughts about brown tree snakes and sick zoo snakes collided in his mind. "Wouldn't it be nice," he thought to himself, "if there were a paramyxovirus outbreak on Guam?" Nichols, who normally searches for ways to prevent ani-



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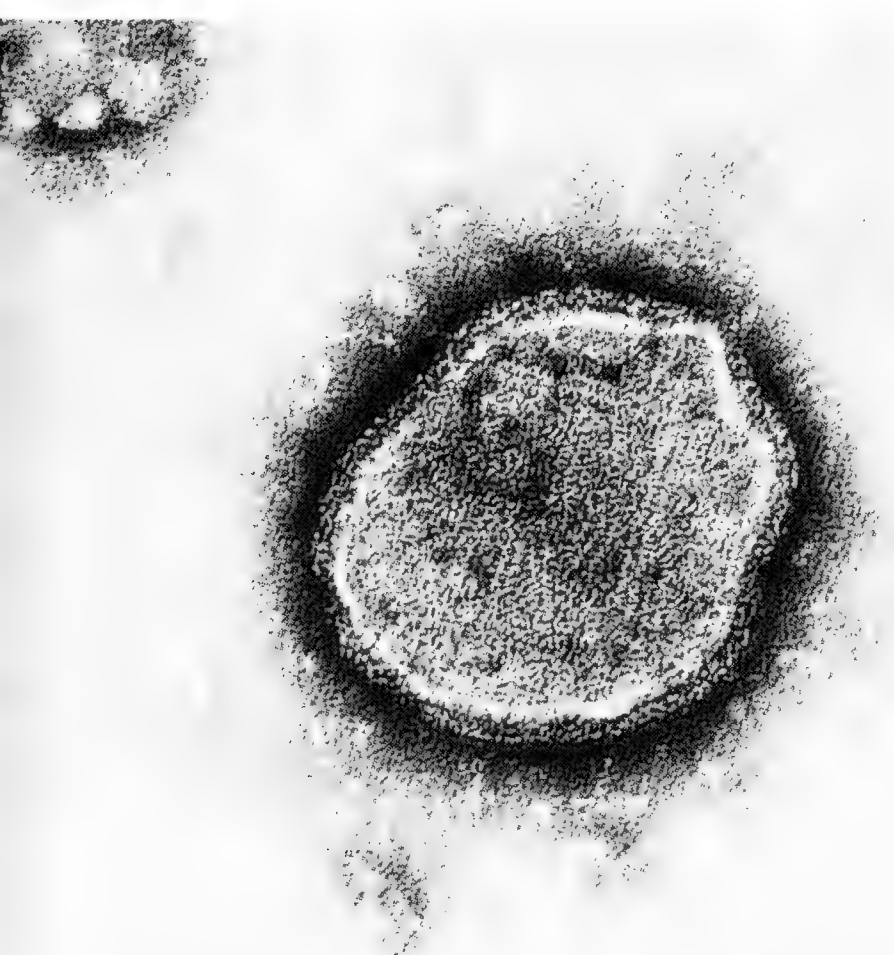
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THE PARAMYXOVIRUS UNDER A MICROSCOPE.

mals from getting sick, suddenly saw a useful application for the problematic pathogens.

With a laboratory full of brown tree snakes, but with no idea which strain of paramyxovirus would actually affect the BTS, Nichols and Lamirande spent several years inoculating their snakes with different viruses and observing their responses. Nichols also has been collaborating with Jim Winton, a fish virologist in Seattle, who

kills about half of the brown tree snakes it infects, and EEGV two-thirds. At first glance, these figures might not seem very impressive. Wouldn't an effective biological control need to kill all of the snakes it comes in contact with? According to statisticians, no. The trick is finding a virus that takes a moderate amount of time to kill its host. Too virulent a virus will wipe out all of the infected snakes before they have a chance to

was able to build a family tree of the viruses based on a genetic analysis. Using this information, the Zoo researchers have now isolated two promising virus strains: one named KSV (for king snake virus, after the type of snake in which the strain originated); the other EEGV (for English *Elaphe guttata* virus, after the corn snake acquired from England in which they isolated the strain).

DON NICHOLS/NZP

In laboratory experiments, KSV consistently

spread the disease across the island. Computer models predict that a 40 to 60 percent mortality rate would have the most effective results.

A human can catch the flu without ever actually making physical contact with someone who is sick. While snakes don't have diaphragms—making it impossible for them to sneeze on each other—a healthy snake likewise can contract a paramyxovirus via secondary contact, such as slithering through a sick snake's secretions. Nichols envisions the following scenario: A contingent of infected snakes is released around Guam and slowly transmits the virus until the brown tree snake population has disappeared for good.

Even with these solutions on the horizon, conservationists can't wait for Guam to become snake-free before initiating recovery programs for the island's endangered wildlife. The recovery of Guam rails such as Horatio offers a glimmer of light on an otherwise dark drama. When the population of Guam rails plummeted from 80,000 individuals in the late 1960s to 50 birds in 1985, DAWR, with the help of Scott Derrickson, began capturing rails for breeding. Biologists were anxious to get the zoo-bred rails back into the wild as soon as possible. To side-

The epiphany came to Nichols one day while separate thoughts about brown tree snakes and sick zoo snakes collided in his mind.

step the snakes on
Guam, they began

an introduction program on the tiny island of Rota, Guam's snake-free neighbor. Located just 36 miles north of Guam, Rota offers a dramatic contrast, with large tracts of native forest, minimal human development, and abundant birdlife. There are no feral goats or pigs on the island, and, best of all, there are no endemic rails to compete with introduced Guam rails for food or nesting sites.

Between December 1989 and February 1991, a team of scientists from DAWR, the Zoo, and the

University of Tennessee released 55 zoo-bred rails on Rota's Sabana, a vegetation-covered coral mesa about 1,200 feet above sea level. Sadly, feral cats, cars, and farm vehicles wiped out this first wave of rails, and the project stalled until 1995, when introductions resumed and biologists documented the first successful reproduction of the birds. Since that time, 215 Guam rails have been introduced to Rota in annual releases, and, with a long-term program to remove predatory feral cats, survival rates continue to improve.

In another ambitious project, conservationists are bringing rails back to the snake hot-zone on Guam. In 1997, DAWR acquired an abandoned portion of Andersen Air Force Base with old runways bordering almost 60 acres of open grassland and limestone forest. The air force erected a fence and a snake barrier around the area and began a rigorous trapping program that removed the brown tree snakes from within. In November 1998, DAWR biologists released 16 rails in the enclosure, and have

since observed
nine nesting birds

exhibiting territorial behavior.

Spurred on by this hard-won success, DAWR is now exploring similar projects in other localized areas on Guam. Even if these birds are restricted to a tiny safe-zone within a sea of snakes, they might someday be part of the first wave of rails to repatriate Guam in the wake of the brown tree snake's eradication. Z

Tim Stoddard, a former intern for ZooGoer, wrote about kiwis in our November/December 1999 issue.

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BOOKS. NATURALLY

***Gobi: Tracking the Desert.* 1999. John Man. Yale University Press, New Haven. 212 pp. Hardcover, \$24.95.**

In 1997 *ZooGoer* ran an article on Mongolian biodiversity. Until then, I knew little about Mongolia beyond some vague notions about where it was (stuck landlocked between Siberia and China) and that lots of it was the Gobi desert. Camels came to mind.

I was surprised first by the Gobi's stunning landscapes, reminiscent of Montana and South Dakota, then by the wildlife. Enlivening the scene are snow leopards, Gobi bears—a rare brown bear subspecies—wild Bactrian camels, gray wolves, khulan or wild asses, huge herds of black-tailed and goitered gazelles, 92 species of birds, and a rich diversity of reptiles. Tahki, or Przewalski's horses, are being reintroduced. (National Zoo scientists at the Conservation and Research Center, with FONZ support, are contributing to this project.)

Although many of these species are rare, it is a testament to Mongolia's strong conservation ethos that they exist at all. Consider that Mongolia established its first protected area in 1778, nearly a century before Yellowstone National Park was declared. The Great Gobi National Park encompasses more than 20,000 square miles, the second largest national park in the world. Fully one-third of the country is protected land!

Will it stay that way? Mongolia's population is growing rapidly, as is the number of livestock—cattle, sheep, goats, camels, horses—putting pressure on the pasturelands

that have sustained Mongolia's people for millennia. Conflicts between traditional herders and snow leopards and wolves that kill livestock are ever present, making conservation unpopular. The country is vigorously courting foreign investment in extractive industries, such as oil and mining, that are seldom environmentally friendly. But after reading about a place that fires a deep desire to experience it firsthand, you hope it can protect its natural wonders and improve the well-being of its people.

In *Gobi: Tracking the Desert*, John Man artfully interweaves sketches of Mongolia's natural and human history, reportage on past and current research in biology and paleontology, and an assessment of the country's conservation and development future, with an account of his own summer traveling there.

He summarizes Mongolian history from favorite son Genghis Khan's imperial conquests to the recent emergence from the former Soviet Union's domination to embrace a free-wheeling capitalism. He talks with a biologist studying snow leopards and meets snow leopard hunters (technically, former hunters; hunting this endangered species is illegal now). He visits sites of breathtaking natural beauty, dank Soviet-style hotels, and traditional gers—large

tents equipped with electricity and satellite dishes to receive CNN and MTV. We share his culinary adventures—mutton, dried curds, and salty buttered tea are staples—and his dismay at the prospect of relieving himself behind a bush when the “bush” is a stubble of short grass. Man tells fascinating stories, made all the more so by their unfamiliarity, to me at least.

If I were a dinosaur aficionado I would have known lots more. As Man tells it, in the 1920s American Roy Chapman Andrews was a much feted celebrity, with the appeal of “the hero of Raiders of the Lost Ark, its star Harrison Ford and David Attenborough rolled into one.” His claim to fame? A paleontologist at the American Museum of Natural History, he organized the first major scientific explorations of the Gobi, returning with vast numbers of new dinosaur fossils at a time when popular fascination with these extinct creatures was even greater than it is today. He remains a legend among fossil hunters, and to this day the Gobi turns up amazing treasure troves of new finds.

Chapman Andrews' success hinged on what was then fairly

new technology: three cars and two trucks. Even without roads, motor vehicles could rapidly criss-cross the Gobi's flat plains, enabling the scientists to cram as much into five summer months as previous explorers did in ten years. On the downside, the publicity that surrounded

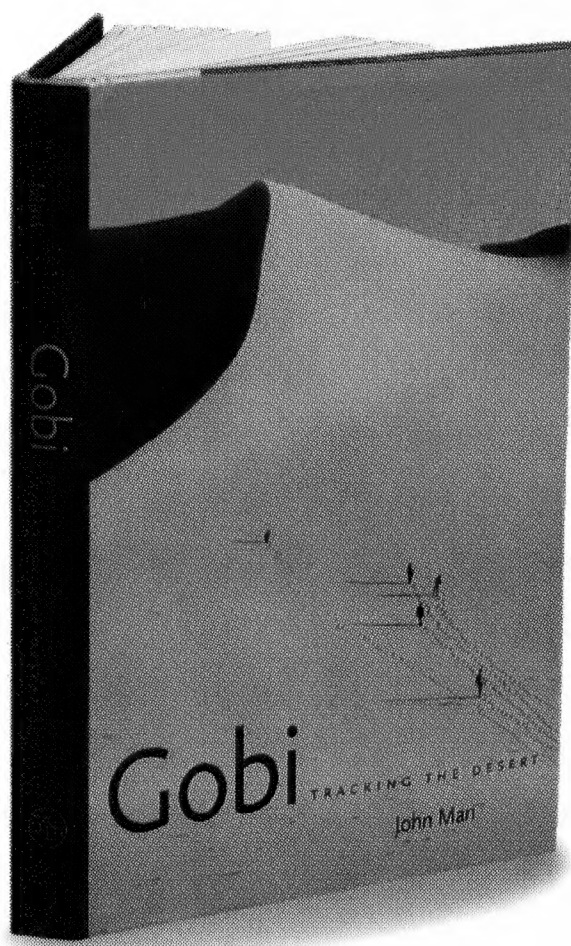
the motorized expedition opened the eyes of fur and wool traders, who rushed in to exploit the region's wildlife.

It's not too different today. A nation the size of Alaska, Mongolia boasts just about 1,000 miles of roads, only 250 of which are called paved. But as Man finds out, paved means something different there. “It seemed,” he wrote of the good road out of the capital Ulan Batar, “the road was little more than a suggestion.” Still, the Gobi is well trafficked, and entrepreneurs are scrambling to attract tourists. Already, there are concerns about too much tourism in this fragile environment.

Man writes beautifully of what he sees and how he feels. Much of his time in the Gobi he was a little lost, he and a varied assortment of drivers, guides, and translators utterly alone, charging ahead not knowing how far or even where their destination was. He describes how strange this is for him. “I felt that odd, and by now familiar, sense of suspension, rare in the West, in which all control is absent. The future was a blank and any concern fruitless. For a timeless moment, half an hour perhaps, I suspended animation.” And, “People and places are found by hearsay.”

Anyone interested in wildlife and wild places, in paleontology, or in the history and culture of a little-known people, will enjoy *Gobi*, especially on a cold winter day: Learning that winter temperatures in the Gobi plummet to -40 degrees—the point, in fact, where degrees Fahrenheit and centigrade meet—will warm you faster than a cup of salty tea with butter.

—Susan Lumpkin



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GOOD NEWS

Environmentalists and other activists are



putting their money where their mouths are. More than two trillion dollars, or one out of every eight dollars under financial management in the United States, is now invested in a socially responsible manner, according to a study released recently by the nonprofit Social Investment Forum. This amount represents an increase of 82 percent from 1997 levels. Socially responsible investing aims to achieve both financial *and* social returns. Examples of socially responsible investments are mutual funds that champion shareholder advocacy; community investing; or stock and bond portfolios that are screened to exclude environmentally destructive companies, tobacco growers, weapons manufacturers, gambling companies, and nuclear power producers.

One might think that this increase merely reflects the booming U.S. economy. However, these type of assets grew at roughly twice the rate of all assets under management in the U.S. over the past two years. The boom in "ethical" investing is tied to the strong financial performance of portfolios, such as the Domini Social Equity Fund and the Green Century Equity Fund, that have routinely outperformed the S&P 500. Socially responsible investing is on a path of steady growth in overseas markets as well. People appear increasingly insistent that their investments be aligned with their

values—especially when they can do so without sacrificing financial success.

—From the 1999 Trends Report of the Social Investment Forum, www.socialinvest.org.

BAD NEWS

Global warming may be fueling weight loss



and low birth rates in Hudson Bay polar bears, according to a study by Canadian Wildlife Service biologists. Polar bears hunt ringed seals from the vantage point of sea ice that forms on the surface of northern polar waters. Hunting success during the spring and early summer appears to be crucial to the bears' survival and reproductive success during the rest of the year. When the pack ice breaks up early, the bears have to go ashore hungry and underweight.

The study, published in *Arctic*, reported that between 1981 and 1998 weights of bears going ashore and the number of cubs born steadily declined. Over about the same time period, the sea ice season has shrunk by three weeks, the probable result of a warming trend in spring temperatures. Similarly, a study in *Geophysical Research Letters* states that the entire Arctic ice cover has thinned by 40 percent over the past two to four decades. This too may lead to early ice breakups.

Altogether this spells bad news for the bears and may lead to a decline in the overall population. Hunger may also drive the bears closer to areas of human habita-

tion in their search for food; human-bear conflicts usually end badly for the bears.

—From www.enn.com (11/16/99), ens.lycos.com (11/22/99), and The New York Times (11/17/99)

AREA SCENE

Satellites focusing on our fair city from space have bad news to report. According to American Forests, a non-profit conservation organization, the tree canopy for the District of Columbia has declined almost by half over the last 25 years. But help is on the way.

Using satellite imagery from Landsat and Geographical Information Systems (GIS) technology, American Forests has compared the acreage of Washington containing significant tree cover in 1973 with 1997. In that period of time, the average canopy coverage has declined from 37 percent to 21 percent—a darkened swath of urban blight replacing once-green patches painting the map. The amount of heavy canopy (plots of land with more than 50% coverage) has plummeted, representing now just 13 percent of District lands, while areas of low tree canopy (less than one-fifth canopy coverage) today define more than 70 percent of the city's landscape.

To combat the decline, the District government is allocating \$9 million for a program to restore trees to Washington. City-wide there are nearly 30,000 plots once reserved for trees which currently contain dead or dying trees, or no trees at all. In the end, the plan

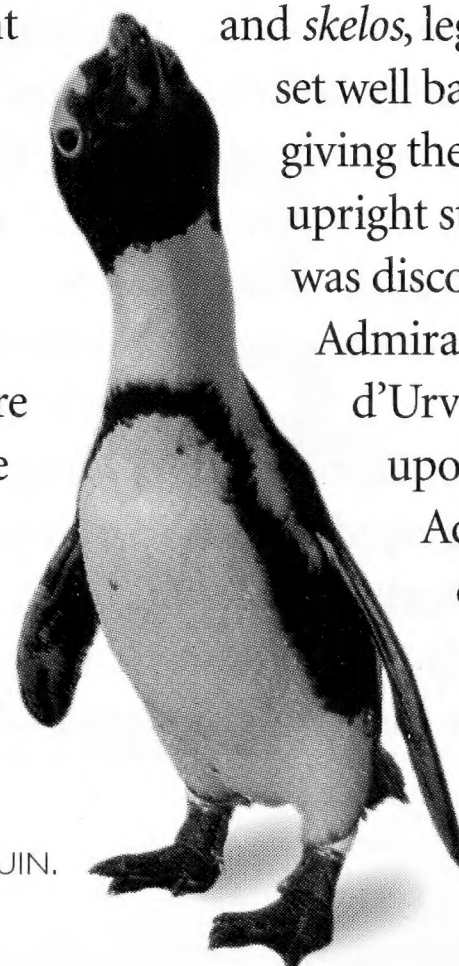
may save money. Trees cleanse the air, prevent stormwater runoff, and provide shade for buildings and streets, reducing the need for air conditioning. The loss of trees since 1973 has required artificial means of removing carbon monoxide, ozone, and other pollutants from the District, at an estimated cost of nearly \$1 million a year in services otherwise rendered free by the trees.

WHAT'S IN A NAME?

The 17 species of penguins come in various sizes and colors, but all belong to the family Spheniscidae, from the Greek meaning "little wedge." This is a reference to all penguins' small wedge-shaped wings. Diversity in other characteristics has led to some interesting species names. Perhaps the oddest is the African, or jackass, penguin, *Spheniscus demersus*. The species name *demersus* is from the Latin *demergo*, meaning "I sink," perhaps referring to the birds' deep dives. The better-known English name is derived from the jackass penguin's peculiar call, which allegedly sounds like a donkey's bray. Also apropos is the Adélie penguin of Antarctica, *Pygoscelis adeliae*. The genus name comes from the Greek *puge*, or rump, and *skelos*, leg. Adélie's legs are

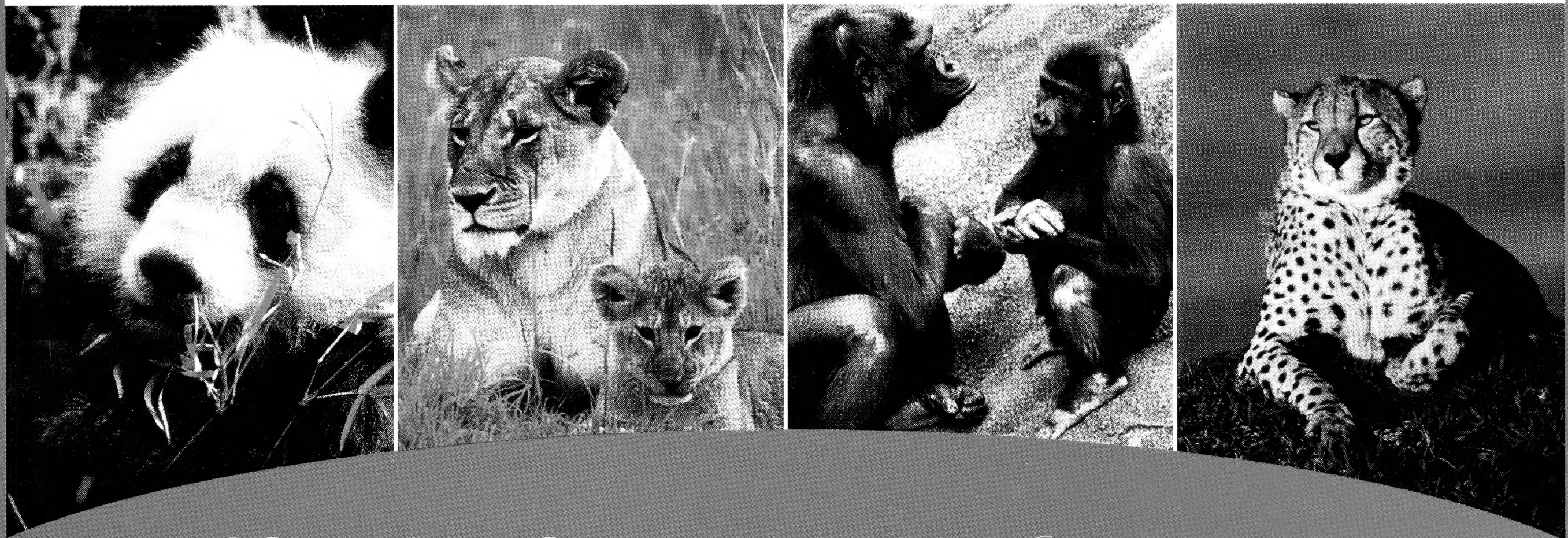
set well back on their rump, giving them their completely upright stance. The species was discovered by the French Admiral J.S.C. Dumont d'Urville, who bestowed upon the birds the name Adélie in honor of his wife.

—compiled by Sarah Flaherty



THE AFRICAN PENGUIN.

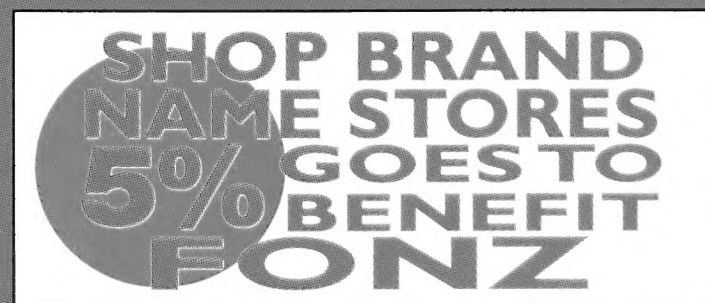
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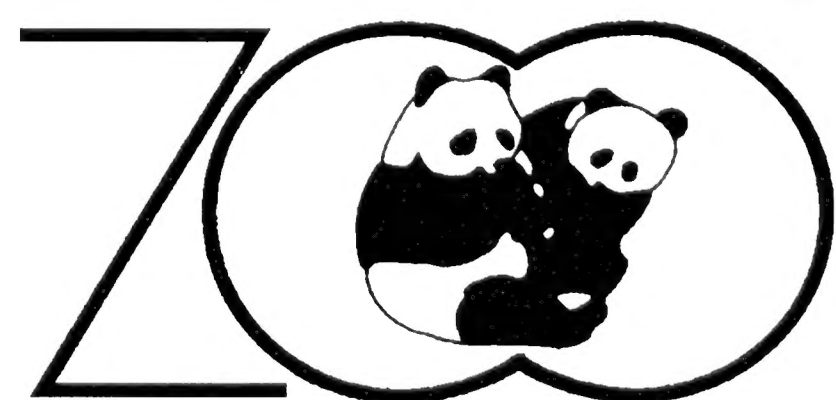
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